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Electrical World

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883 Mission St.
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Washington

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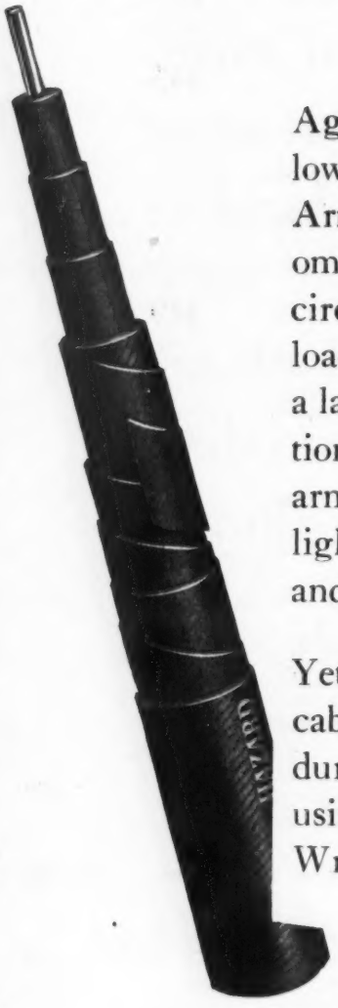

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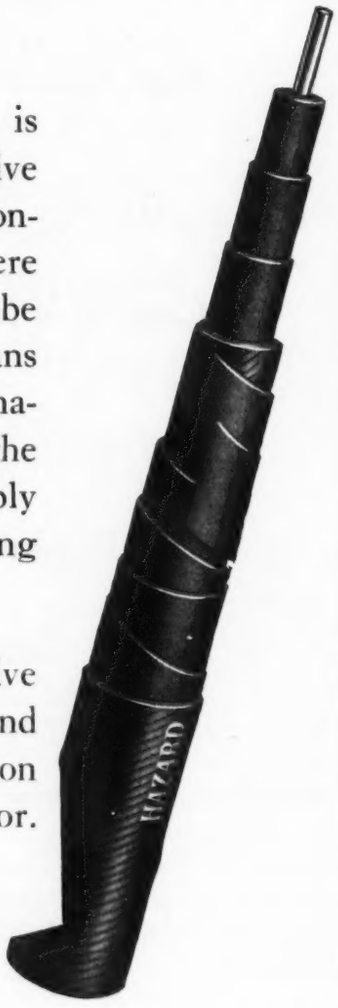

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Electrical World

A McGraw-Hill Publication—Established 1874

L. W. W. MORROW, *Editor*

Volume 94 *New York, Saturday, August 31, 1929* Number 9

When Motors Boost Real Estate Values

ELECTRICITY added another victory to its already long list of achievements when the new plaza and structure of the Chicago *Daily News* Building was erected. A few comparatively small motors, a system of troughs and a soot collector added thousands of dollars to the property value of a mid-city section.

Steam-railroad terminals have long been problems for the city planner, so that it was a real step forward when the network of tracks entering the Chicago Union Station was straddled by a great skyscraper and the otherwise troublesome, disagreeable and dangerous exhaust gases were led through expansion ducts over each track to precipitation chambers and vented by fans to the open air twenty-five stories above the street, clean, sootless and above the usual levels.

There are steam-railroad terminals in almost every American city which in their approaches render the trackage area virtually useless for building purposes. While awaiting the idyllically satisfactory moment when virtually all steam railroads become electrified it may prove both desirable and highly worth while for architects and prospective builders of great city structures to consider such an expedient as Chicago has adopted either as a temporary or permanent feature of certain buildings.

* * *

Rate Reductions and Sales Increases

AN INTERESTING analysis of the effect of rate reductions on sales and revenues is made by E. S. Zuck on page 415 of this issue of the Electrical World. The conclusion is reached that each one per cent decrease in rates is accompanied by a two per cent increase in energy sales, but the effect on revenue is variable.

This conclusion by the author is valid for the data shown but should be used with great discretion in the further development of domestic business. At this stage of growth most of the rate changes have been made by cutting the top rate that affects all customers and by adding so-called inducement steps in existing rates for the encouragement of the use of appliances involving heavy consumption. The general result is an immediate effect on revenues and a slow development of large customers to compensate for the decreased income. Thus the commercial situation with respect to domestic use and the political situation with respect to top-rate reductions both influence the data and the conclusions to be drawn.

It is the form of rate that is the key to profitable domestic business. Existing revenues from small customers are reasonable and should be maintained, and efforts should be concentrated on building more complete service in the homes. This requires a real inducement rate and an adequate sales program. Experience shows that rate reductions in themselves will not develop business in desirable quantity—they must be accompanied by sales efforts.

It is evident from the data that much remains to be done to place domestic revenues on a profitable basis and to give customers complete service. The trend is healthy, but progress is slow. It can be speeded up by adjusting rate forms to give a real inducement rate for the use of heavy-consumption appliances and then gearing up the commercial department to get the appliances used. There is no half-way answer.

* * *

Labor and the Electric Utilities

ADOPTION at Atlantic City last week by the executive council of the American Federation of Labor of a resolution to conduct an investigation of the policies of public service corporations, including holding companies, in order to determine their general attitude toward labor, need not cause electric public utilities much concern. Labor is as a rule favorably inclined toward electric public utility companies, because, as the late Samuel Gompers expressed it, "organized labor is the enemy of autocracy and bureaucracy alike, and it sees in government ownership no necessary remedy." However, the street-railway strike in New Orleans called for some action on the part of the central labor body, and it is but natural that the local union should be sustained. Hence the resolution, the street railway and the lighting company being under common ownership and management.

Like those of most other organizations, the actions of the American Federation of Labor are governed largely by self-interest, and labor leaders are frank to admit that whatever stand the unions make take is determined primarily by what is regarded as best for the membership as producers rather than as consumers. That is to say, the unions are more concerned with wage scales than

with rates and would strike for a 10 per cent increase in wages even though it should mean an increase in the cost of a street-car ride or the cost of electricity.

Labor in this country is not inclined to be either reactionary or radical. It has fought socialism and communism and for the most part has lived in peace and harmony with industry and shared in the general industrial prosperity. Unanimity, unfortunately, does not always exist in the councils of labor; nor does performance always match promise. But whatever else labor may be seeking at the moment, it is not proposing nationalization or government ownership. Self-interest dictates otherwise, and not many years ago, the executive council of the American Federation of Labor contended that "the largest freedom of action, the freest play for individual initiative and genius in industry, cannot be had under the shadow of constant incompetent political interference, meddlesomeness and restriction."

* * *

Can Quality Standards Be Stated?

FROM several directions there have come about action and discussion as to quality standards for electrical equipment used in the homes. A general feeling exists that some protection should be given to users of electricity against shoddy and inadequate plugs, cords and appliances, and that quality as well as fire and accident hazards should be made part of the industry program for complete electric service.

But who can fix the quality standards and who shall make tests to fix quality elements? A minimum quality standard is faulty, and so is a fairly high quality standard, while any attempt to make graded standards introduces many difficult problems. Plugs and cords are available with a very wide range in cost and quality, yet who can fix tests and specifications adequate to the commercial situation? One finds hot plates on the market in the ten-cent stores and in the exclusive jewelry stores, but who can state precisely the quality elements that define an adequate hot plate?

The making of quality standards is not a code job, nor is it a scientific laboratory undertaking. There should be no ironclad detail code clauses with an inflexible and time-killing procedure to care for changes, nor should there be a formidable and precise test specification that eliminates equipment because of technicalities in detail. The industry in all its branches is trying to get more electric service in the home, and the attempt to fix quality standards is an effort to make the industry's commercial effort more effective by fixing adequacy of service as one element in a satisfactory sale. The word "standard" is a misnomer.

For these reasons the industry should go slow in establishing a procedure for making quality standards. A committee of executives representative of all industry branches should be named to study the whole situation and to work out a plan of procedure. Only part of this procedure will involve defining quality standards and methods for making these standards. An equally important task will be to state an educational and publicity program that will establish public confidence in the standards that are established.

* * *

The Local Operating Executive

OPERATING ratio, the quotient of operating expense divided by gross revenue, is a function to conjure with in evaluating the management efficiency of an electric utility. As the ratio is whittled down over a period of years it reveals, granting that the accounting system has not been subverted, a steadily healthier condition of the company. Conversely, as it swells out with a fraction of a per cent here and there, it warns the management that sand has somehow got into the gear box.

The transmission-type system that is typical of virtually all electricity supply in the vast area west of the Mississippi often exhibits an operating ratio that would make the executives of central stations in more densely populated regions gasp. Many of the constituent parts of these systems, and also many of the complete systems themselves, have passed through a succession of ownerships before they have finally come into the control of a management that tries, really seriously, to operate them in an efficient manner. In many cases the generating stations, previously isolated under either municipal or private ownership, remain as normal producers or standby plants in the system. The first promoters of the interconnected systems often tied these plants together with lines that, either through ignorance or disregard of the principles of elementary electrical engineering, were wholly inadequate. Succeeding owners, simply holding their "buys" for profitable resale, made no attempts at all, or at best only feeble gestures, toward improvement of these unsatisfactory conditions. The result is that the *bona fide* operator, when at last these puny lines and inefficient generating stations fall into his lap, is faced with an appalling job as he tries to offer adequate service to his customers.

Before they were tied into the transmission network many of the isolated private and municipal systems had operating ratios as high as 75 per cent. They kept going because their customers had no conception of service quality and thus maintenance could be neglected. Moreover, the ideas of fixed costs were extremely hazy in the minds of the managements, if any existed there at all. The promoters who then came along evidently had no better ideas on operation. The lines they built were merely wires hung on poles, and the cost of keeping them in operation was enormous. Actually hundreds of miles of line were built and tied into alleged systems without the inclusion of a single relay, oil circuit breaker or any other kind of protective device. The operating ratios remained high and sometimes even went higher.

And then came the legitimate operator. He has had and has yet a hard row to hoe. He knows that a trans-

mission-type system of the best design and with the best equipment is skating close to disaster when the operating ratio approaches 65 per cent. The tangle of copper and iron that is his system is far from that ideal. He must build heavier and better protected lines and more efficient generating stations, and such building takes money—lots of it. He cannot increase revenue by raising rates; it is simply not done in this day. He is apparently faced with the job of covering a twelve-by-sixteen-foot floor with a ten-by-fourteen-foot carpet. To his great and enduring credit he does this impossible thing. How he does it possibly he himself cannot completely tell. He may, probably will, assign the glory to the men of his organization. It is, in fact, all the more to his credit if he passes the laurel wreath on to his subordinates.

* * *

Plant Development Based on Interconnection

EXPANSION of generating plant facilities in any regional evolution of electrical supply systems is coming to be more and more affected by interconnection. The economic importance of well-engineered tie lines between neighboring companies is increasing rapidly.

In the report of the power generation committee presented at the recent Swampscott convention of the American Institute of Electrical Engineers appeared some revealing comments upon the recurring cycles of hydro- and steam-plant development, and the prediction was made that a wave of new steam stations may be expected within the next few years. Stress was laid upon the need of providing generating capacity well in advance of ultimate development, and the interlocking of steam and hydro installations to facilitate a consistent program of plant construction was shown to be most useful. It is obvious that on systems under a common management interconnection of generating stations fits into a system-planning program as a *sine qua non;* but in areas occupied by competitive systems—and there are many such neighbors—there is still a disposition to schedule plant development on an independent basis.

A number of recent commitments in invested capital for generating-plant construction have been absolutely conditioned for their authorization upon intercompany tie lines and associated power contracts. In a typical case a hydro-electric development now under way about 200 miles from an urban load center would still be in the paper stage if provision had not been made for supplying the metropolitan company with something like 150,000,000 kw.-hr. per year over a tie-line trunk, and without the construction of this line the city station would have been obliged to enlarge its facilities by about 75,000 kw. in steam-unit capacity. Here two companies have studied the regional situation together, and while plenty of argument and self-interest were apparent in the conferences preceding the signing of the contract, sight was never lost of the underlying importance of interconnection as a factor in the evolution of territorial power supply. And so, as one reads the A.I.E.E. report with appreciation of its admirable sensing of the economic values resident in cyclic steam and hydro-plant development in a given region, the thought is inescapable that interconnection has become a major influence in system planning and that adequate plant-development programs must weigh its possibilities among independent companies no less than in laying out programs for territorial power supply under unified management.

* * *

A Structural View of Welding

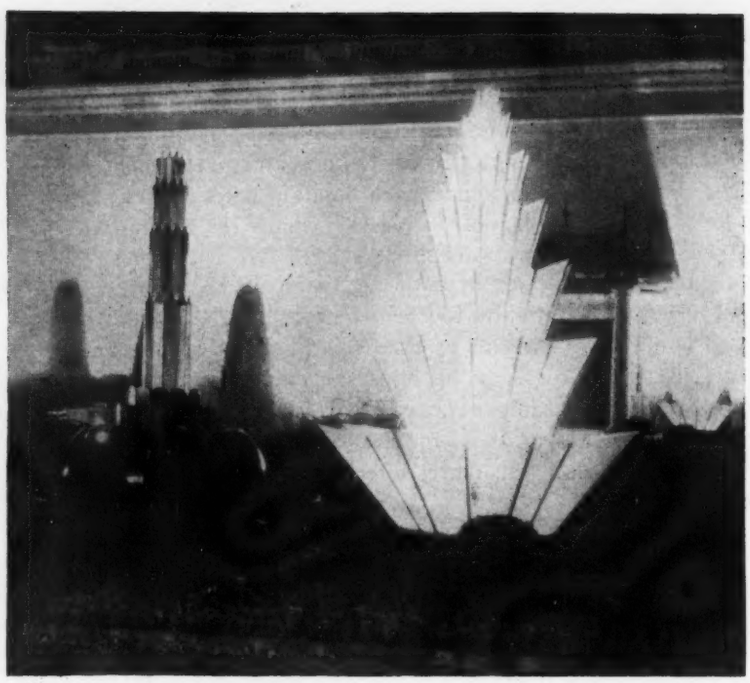
THE building trade is notably conservative and methods of construction are based on age-old experiences. The conservatism of the oldest branch of the engineering profession is also notable, and the comments of J. E. Tonnelier on electric welding for structural work, given on page 429 of this issue, should be read with the constructive purpose of understanding the point of view of a structural engineer and of overcoming any handicaps to electric welding that exist.

Electric welding is here to stay, and its advocates will claim that Mr. Tonnelier is entirely too pessimistic in his article. Too many of his statements are based on a comparison of welding with existing practices, and he omits the advantages that would accrue by using all the possibilities of electric welding in the development of entirely new structural practices. What if present structural steel fabrication and production are based on riveting? Industry in this country is accustomed to discarding old methods for better and cheaper methods. If structural shapes can, by the use of welding, be made without rivet-hole drilling and without the numerous accessory plates involved in riveting construction, why not make them? The governing elements are total overall cost to industry and satisfactory service. Welding is not an equivalent of old methods; it is a new method entirely.

Only within three or four years has welding come into electrical machinery manufacture, although its possibilities were known for years. Conservatism ruled, and welding was taboo even with those manufacturers who developed it. But now all is changed. Large electrical apparatus is made of welded steel parts, and the foundry, the storage of patterns, the enormous amount of machine-tool work, the excessive cost of special designs, the loss of time involved in casting and a host of other cost elements in manufacture have been eliminated. It has proved itself far superior for service purposes and has revolutionized electric machinery manufacture. It took time to bring about the change, but it came.

In the structural steel field lies a big opportunity for electric welding. No one advocates its use in this field unless it is more economical and better than other methods. Electrical men believe this to be true and that this statement will be proved if welding shall have a fair showing. They desire only a chance for a fair and unbiased decision based on performance.

Spectacular Lighting at Barcelona



One of Several Illuminated Cascades in Front of the Exposition Building

ONE of the beautiful achievements of the Barcelon̄ International Exposition is effected through the use of spectacular lighting. Many waterfalls and fountains as well as streets and buildings are lighted by mobile waves of color. The tremendous lamp load of 5,232 kw., controlled from a central point, is designed to emphasize the natural beauty of the surroundings and presents by night a marvelous vista of arresting splendor. The lighting effects were designed by Westinghouse company's engineers and the equipment was built and installed under their direction.

Portion of Illuminated Garden in Front of the Palacio Reina Victoria

Photos courtesy Westinghouse Electric & Manufacturing Company

Rate Reductions and Sales Increases

By E. S. Zuck
United Gas Improvement Company, Philadelphia, Pa.

For a given reduction of 1 per cent in rates an increase of 2 per cent in sales may be expected. Effect on revenue variable. Analysis of five years' experiences of 40 utilities

IT IS well known to the industry that rate reductions stimulate use to such an extent that in practically all cases revenue per customer or meter continues to increase. This increased use is sometimes, for the want of a better name, termed the "recovery." Frequently the questions are asked in connection with a proposed rate reduction, What recovery can be expected? What increase in kilowatt-hour sales per customer will be realized from a given rate reduction? These questions are difficult to answer, since there are so many factors which may affect the result. One of the principal difficulties is the lack of general data showing average results of a number of companies which have gone through the experience of rate reductions and increased sales, which may be used as a basis in forecasting the answers to these questions.

The data presented in the May 25, 1929, issue of the Electrical World give the experience of 57 operating organizations as regards rate reductions, kilowatt-hour sales and revenue per customer. For 41 organizations the data are complete over a five-year period. One company reports, however, an increase in rates and has been omitted, therefore, from the analysis that follows, since increases in residence rates have been the exception rather than the rule during the past five years.

Starting with kilowatt-hour sales and revenue per customer per year shown in the tabulation given on pages 1036, 1037, 1038 and 1039 of the May 25 issue, there have been added the average rate earned per kilowatt-hour, the per cent decrease in rate, the per cent increase in kilowatt-hour sales and the per cent increase in revenue. Table I shows the revised results.

Without further analysis the figures in Table I show in a general way only that rate reductions do result in increased sales and revenue. With so many companies reporting, it would seem that there should be a more or less definite relation between the amount of rate reduction and the increase in sales. With this in mind,

Relation Between per Cent Decrease in Rate and per Cent Increase in Kilowatt-Hour Sales for Residence Service

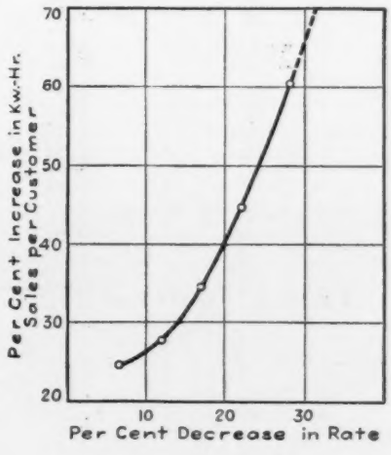


Table I—Sales and Revenue Changes for 40 Utilities

Company No.	Per Customer per Year: Kilowatt-Hour 1924	Kilowatt-Hour 1928	Revenue 1924	Revenue 1928	Average Rate per Kilowatt-Hour 1924 Cents	Average Rate per Kilowatt-Hour 1928 Cents	Decrease in Rate Per Cent	Increase in Kilowatt-Hour Per Cent	Increase in Revenue Per Cent
3	314	464	$32.54	$38.28	10.36	8.25	20.35	47.80	17.63
4	358	489	32.55	38.18	9.10	7.80	14.28	36.58	17.29
6	337	445	30.53	37.36	9.06	8.40	7.28	32.10	22.40
8	384	516	30.44	35.53	7.93	6.89	13.11	34.39	16.70
13	385	483	27.76	34.58	7.21	7.15	0.83	25.41	24.59
14	258	409	28.69	34.44	11.11	8.41	24.35	58.50	20.00
15	461	724	27.81	34.26	6.04	4.73	21.65	57.00	23.20
16	340	469	33.73	34.17	9.92	7.28	26.61	37.95	1.31
17	318	447	28.70	33.80	9.02	7.56	16.18	40.60	17.78
18	456	851	25.29	33.61	5.55	3.95	28.80	86.60	32.90
19	265	436	24.84	32.87	9.38	7.55	19.50	64.50	32.30
21	290	392	31.56	32.64	10.88	8.33	23.30	35.20	3.43
22	389	477	27.67	32.46	7.11	6.80	4.36	22.60	17.31
23	524	649	29.30	32.25	5.59	4.96	11.27	23.85	10.10
24	376	476	27.63	32.22	7.35	6.78	7.75	26.59	16.61
26	257	349	25.59	32.01	9.96	9.16	8.04	35.80	17.29
28	407	536	27.40	31.60	6.73	5.90	12.32	31.70	15.30
30	384	461	30.76	31.44	8.01	6.82	14.85	20.02	2.20
31	490	868	23.31	30.74	4.76	3.54	25.65	77.10	31.90
32	326	415	26.88	30.35	8.25	7.31	11.39	27.30	12.00
34	339	478	$25.79	$30.20	7.60	6.32	16.84	41.00	15.80
35	247	586	18.85	30.12	7.63	5.14	32.60	137.20	59.80
37	424	545	29.58	29.88	6.97	5.49	21.22	28.51	1.00
38	306	375	26.90	29.84	8.79	7.95	9.55	22.55	10.92
39	260	371	24.86	29.10	9.56	7.84	18.00	42.70	17.05
41	420	513	26.24	28.77	6.25	5.61	10.25	22.12	9.64
42	417	537	27.56	28.76	6.60	5.35	18.95	28.80	4.35
44	330	411	24.00	28.43	7.27	6.92	4.81	19.70	18.45
45	494	582	26.05	28.04	5.27	4.81	8.72	17.80	7.65
46	361	427	25.49	27.60	7.06	6.46	8.50	18.28	8.24
47	329	420	22.72	27.09	6.90	6.43	6.80	27.40	19.21
49	339	373	28.20	26.90	8.31	7.21	13.20	10.01	—4.83
50	326	463	23.89	26.58	7.33	5.74	21.70	42.00	11.25
51	470	581	24.88	26.27	5.30	4.52	14.70	23.61	5.59
52	427	572	22.12	25.90	5.17	4.53	12.00	34.00	17.10
53	260	374	23.76	25.84	9.52	6.81	28.40	40.00	8.75
54	398	520	22.11	25.84	5.55	4.97	10.45	30.61	16.87
55	432	502	26.57	25.76	6.14	5.13	16.45	16.20	—3.14
56	284	377	22.02	24.33	7.75	6.18	25.40	32.73	10.50
57	324	361	27.04	21.35	8.33	5.91	29.00	11.42	—21.00

Table II—Utilities Grouped According to per Cent Rate Changes

Group	Company No.	Decrease Rate Per Cent	Increase Sales Per Cent	Increase Revenue Per Cent
1	13	0.83	25.41	24.59
	22	4.36	22.60	17.31
	44	4.81	19.70	18.45
	47	6.80	27.40	19.21
	6	7.28	32.10	22.40
	24	7.75	26.59	16.61
	26	8.04	35.80	17.29
	46	8.50	18.28	8.24
	45	8.72	17.80	7.65
	38	9.55	22.55	10.92
	Total	66.64	248.23	162.67
	Average	6.66	24.82	16.27
2	41	10.25	22.12	9.64
	54	10.45	30.61	16.87
	23	11.27	23.85	10.10
	32	11.39	27.30	12.00
	52	12.00	34.00	17.10
	28	12.32	31.70	15.30
	8	13.11	34.39	16.70
	49	13.20	10.01	—4.83
	4	14.28	36.58	17.29
	Total	108.27	250.56	110.17
	Average	12.03	27.84	12.24
3	51	14.70	23.61	5.59
	30	14.85	20.02	2.20
	17	16.18	40.60	17.78
	55	16.45	16.20	—3.14
	34	16.84	41.00	15.80
	59	18.00	42.70	17.05
	42	18.95	28.80	4.35
	19	19.50	64.50	32.30
	Total	135.47	277.43	91.93
	Average	16.93	34.68	11.49
	3	20.35	47.80	17.63
	37	21.22	28.51	1.00
	50	21.70	42.00	11.25
	15	21.65	57.00	23.20
	21	23.30	35.20	3.43
	14	24.35	58.50	20.00
	Total	132.57	269.01	76.51
	Average	22.10	44.84	9.75
	56	25.40	32.73	10.50
	31	25.65	77.10	31.90
	16	26.61	37.95	1.31
	53	28.40	40.00	8.75
	18	28.80	86.60	32.90
	57	29.00	11.42	—21.09
	35	32.60	137.20	59.80
	Total	196.46	423.00	124.16
	Average	28.07	60.43	17.74

Table III—Summary of Rate, Sales and Revenue Changes

Decrease Rate Per Cent	Increase Sales Per Cent	Increase Revenue Per Cent
6.66	24.82	16.27
12.03	27.84	12.24
16.93	34.68	11.49
22.10	44.84	9.75
28.07	60.43	17.74

the data in Table I have been grouped according to the per cent decrease in rate as shown in Table II and then averaged to obtain the average per cent reduction in rate, per cent increase sales and per cent increase in revenue for each group. The average figures are summarized in Table III and plotted as a curve.

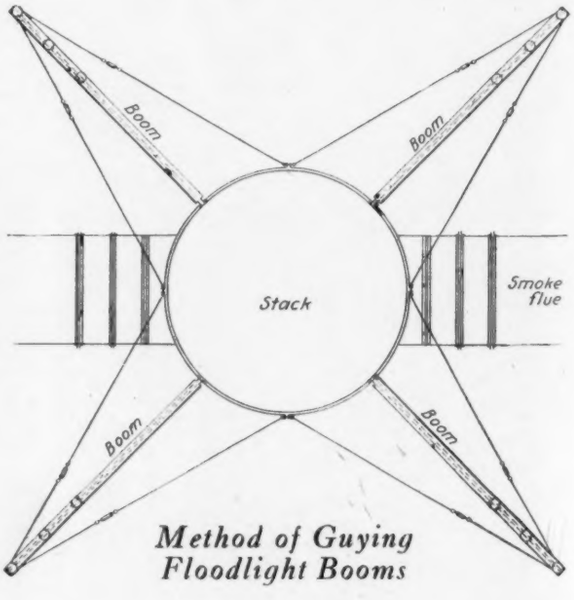
The relation between rate decrease and sales increase is easily apparent from both the table and the curve. It may be stated that over a five-year period 1 per cent decrease in rate yields 2 per cent increase in kilowatt-hour sales per customer. There is a strong upward trend to the curve indicating that for decreases amounting to over 25 per cent even greater than 50 per cent increase in sales should result. While there are many factors which influence the final results in individual cases, it is believed that the relation just stated is a reliable average and a good guide to what can reasonably be expected.

The per cent increase in revenue is also shown in both Tables II and III. In only three cases were there decreases in revenue per meter, indicating that recovery has not been complete. In general, the increase in sales has been sufficient not only to maintain revenue per meter but also to increase it. There is a tendency for the per cent increase in revenue to fall off with larger rate reductions, although in the case of group 5 the per cent increase in revenue jumps to 17.74 per cent. This is probably due to company 35 falling in this group with a 59.8 per cent increase in revenue, thus bringing up the average in spite of a 21 per cent decrease in revenue reported by company 37.

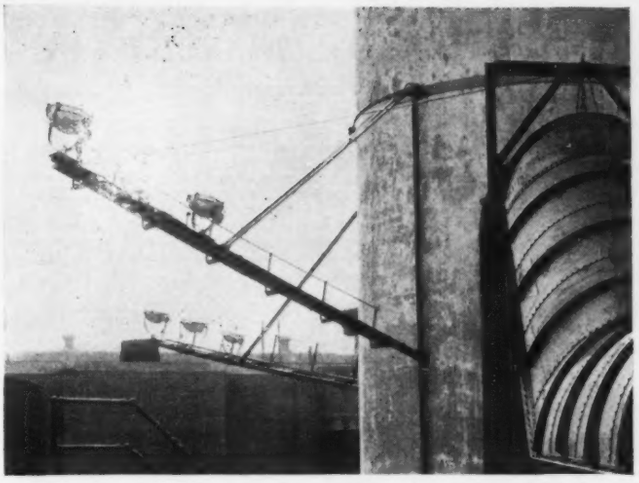
Referring again to Table III and the accompanying graph the values shown for the first point of the curve do not come within the 1 to 2 ratio previously pointed out. The decrease in rate over the five-year period amounts to only an average of 6.66 per cent, indicating, therefore, that there have been no real rate reductions over the period and that the decrease in rate is no doubt due to the natural effect of increased consumption toward lowering the rate earned. At the same time the increase in sales over the period for the first group has averaged only 24.82 per cent, or approximately 5 per cent per year, which is about normal increase. With the other groups, where there have been reductions of considerable amount, the increase in sales has been more than the normal increase and companies which have made real rate reductions have increased their sales per meter at a much greater rate than the normal rate of growth.

To Keep Airplanes Away

THE concrete stack of the South Meadow station of the Hartford Electric Light Company is close to the Hartford airport, and to prevent fliers from approaching too close to this chimney and to permit it to serve as a beacon the illuminating engineering department of the Hartford company has designed a floodlighting installation which has been mounted above the station roof to throw all four quadrants of the stack into bold relief throughout the night. The stack is about 160 ft. high above the roof and 16 ft. 6 in. in outside diameter at the top. The floodlights are mounted in groups of



Method of Guying Floodlight Booms



Stack Floodlights Protect Aviators and Are Accessible for Safe Maintenance

three on four inclined steel booms attached at right angles to the stack, the inner lamp of each unit being rated at 500 watts and the two outer lamps of each unit at 1,000 watts each, making a total of four 500-watt and eight 1,000-watt lamps in service. The 500-watt lamps are mounted in "CA-14" and 1,000-watt lamps in "CA-16" Westinghouse narrow beam projectors, the floodlamps being "G-40's." All lamps, aggregating 10 kw. rating, are in service simultaneously and are controlled by a single switch on the 115-volt station service system.

Each boom is composed of two structural steel angles, about 21 ft. long, braced by a hanger attached to a steel strap surrounding the stack. Vertical struts secure the inner ends of the lamp booms and strap around the stack. A safety rail facilitates lamp inspection and maintenance. The 500-watt lamps are mounted about 9 ft. 6 in. above the roof and the two 1,000-watt lamps at about 10 ft. and 10 ft. 6 in. on each boom. W. D. Gorman is illuminating engineer of the company.

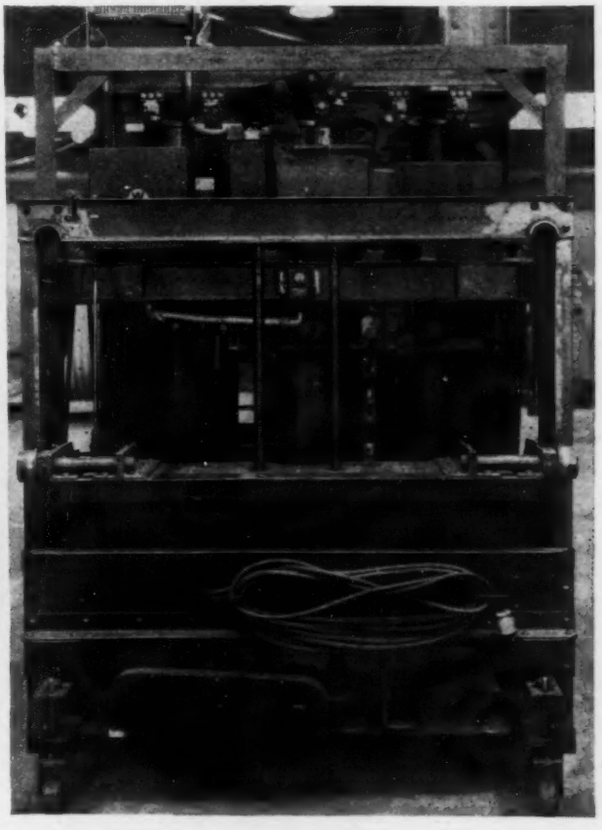
Metal-Clad Gear Saves Space

By George E. Heidenreich
Columbia Engineering & Management Corporation, Cincinnati, Ohio

INCLUDED in the construction program for 1928 of the Union Gas & Electric Company, Cincinnati, Ohio, was the addition of a number of 13.2-kv. feeder positions in the West End generating station. Existing bus sections occupied all available space in the switchhouse and excessive cost prohibited the construction of additional building space. It was, therefore, decided to utilize the upper floor of an office section in the station. The use of this location, due to its low ceiling height and limited amount of floor space, brought about the decision to use unit type, compound-filled, metal-clad switchgear.

Eight units of this gear were purchased from the Westinghouse Electric & Manufacturing Company for the installation of four outgoing 13.2-kv. feeders of 15.000-kva. capacity each. The accompanying illustrations show the unit after the installation had been practically completed and give a good idea of the small amount of space required. The circuit breakers are of the vertical disconnect type and the instrument transformers are an integral part of each unit.

Disconnecting operations and removal of breakers for inspection are accomplished by means of a motor-operated truck which is run into the compartment un-



Unit Type Metal-Clad Switchgear on 13.2-Kv., 15,000-Kva. Feeder and Metal-Clad Gear Removed for Inspection

derneath a switch and carries it off its supporting points. Power for the truck is furnished through an extension cord, which may be plugged in at convenient places on the wall.

Census Reports 1927 Operations

Electric revenue $1,802,655,493. Increased 76 per cent since 1922. Valuation more than doubled

THE Department of Commerce announces that, according to returns received at the quinquennial census of electrical industries taken in 1928, the output of current by commercial electric light and power plants increased from 38,413,240,163 kw.-hr., or 95.3 per cent of the total output of commercial and municipal plants, in 1922, to 71,306,839,538 kw.-hr., or 95.5 per cent of the total in 1927, and the output of municipal plants increased from 1,878,296,272 kw.-hr., or 4.7 per cent of the total, in 1922, to 3,379,538,472 kw.-hr., or 4.5 per cent of the total, in 1927. This report supplements one issued last March; more detailed data on the electric light and power industry will be contained in the final report. The only increase was in the group of municipalities purchasing all current.

The numbers both of commercial and of municipal plants (counting each separate generating station as a separate plant) decreased between 1922 and 1927, but the rate of decrease for municipal plants was greater than that for commercial plants, so that the proportion which the number of municipal plants formed of the total decreased from 33.6 per cent in 1922 to 25.2 per cent in 1927.

The number of customers served by municipal plants shows a considerable increase—from 1,644,744 in 1922 to 2,128,868 in 1927—but it constituted a smaller proportion of the total, falling from 12.9 per cent in the earlier to 9.8 per cent in the later year.

Table I gives comparative figures for commercial and municipal plants for 1927 and 1922 and Table II presents statistics for municipal plants in cities having 25,000 inhabitants or more for 1927.

Table II—Municipal Plants in Cities Having 25,000 Inhabitants or More, 1927

The same form of schedule was used for canvassing all commercial electric light and power plants and municipal plants in cities having 25,000 inhabitants or more (as estimated for July 1, 1927), and a much smaller form of schedule was used for canvassing municipal plants in cities having fewer than 25,000 inhabitants. The latter form of schedule did not call for data in regard to receipts from sources other than sale of current, nor for data in regard to expenses, it having been found at previous consuses that such data as reported by municipal plants in small cities and villages were inaccurate to such an extent as seriously to impair the value of the statistics compiled therefrom.

Number of establishments	44
Generating all or part of current	39
Purchasing all current	5
Number of separate generating stations	57
Value of plant and equipment	[1]$224,731,761
Total revenues	$52,406,293
Electric service	$50,741,819
All other sources [2]	$1,664,474
Total expenses [3]	$40,063,351
Total number of persons employed	6,084
Prime Movers:	
Number of units	210
Total horsepower	1,081,990
Generators:	
Number	203
Kilowatt capacity	766,033
Output, kilowatt-hours, total	2,711,722,297
Generated	2,229,090,983
Purchased	482,631,314
Kilowatt-hours sold, total	2,250,659,658
To ultimate consumer	1,698,059,084
For resale	552,600,574
Number of customers	689,775

[1] Includes $5,784,671, value of plant and equipment owned by companies engaged in the operation of electric light and power plants and of other public utilities, not distributed among the several utilities. It is practically certain that more than half of this amount represents the value of plant and equipment properly chargeable to the electric light and power industry.

[2] Miscellaneous electric revenues, net income from utilities other than electric and non-operating income. Does not include amount of rents credited to income nor amortization of franchises (called for as net items on the 1927 schedule).

[3] Operating expenses, interest and other deductions from gross income. Does not include amount of rent payments for lease of plant, equipment, etc.

Table I—Summary of Commercial and Municipal Electric Light and Power Establishments, 1927 and 1922

	1927			Per Cent of Total		1922			Per Cent of Total	
	Total	Commercial	Municipal	Commercial	Municipal	Total	Commercial	Municipal	Commercial	Municipal
Number of establishments	4,335	2,137	2,198	49.3	50.7	6,355	3,774	2,581	59.4	40.6
Generating all or part of current	2,326	1,218	1,108	52.4	47.6	4,389	2,650	1,739	60.4	39.6
Purchasing all current	2,009	919	1,090	45.7	54.3	1,966	1,124	842	57.2	42.8
Number of separate generating stations	4,796	3,589	1,207	74.8	25.2	5,444	3,615	1,829	66.4	33.6
Value of plant and equipment	$9,297,388,356	[1]$8,880,291,499	$417,096,857	95.5	4.5	$4,465,015,691	$4,229,356,023	$235,659,668	94.7	5.3
Total revenues	.....	$1,841,227,495	.....	.....	.....	$1,072,119,883	$986,684,273	$85,435,610	92.0	8.0
Electric service	$1,802,655,493	$1,680,218,664	$122,436,829	93.2	6.8	[5]$1,020,439,038	[5] $936,851,679	[5]$83,587,359	91.8	8.2
All other sources	.....	$161,008,831	[3]	.....	.....	$51,680,845	$49,832,594	$1,848,251	96.4	3.6
Total expenses	.....	[2]4$1,318,255,150	[3]	.....	.....	$859,625,091	$792,496,243	$67,128,848	92.2	7.8
Total number of persons employed	250,986	234,713	16,273	93.5	6.5	150,762	136,105	14,657	90.3	9.7
Prime Movers:										
Number of units	12,030	9,147	2,883	76.0	24.0	13,242	9,547	3,695	72.1	27.9
Total horsepower	35,710,128	33,661,406	2,048,722	94.3	5.7	19,850,860	18,570,732	1,280,128	93.6	6.4
Generators:										
Number	11,967	9,063	2,904	75.7	24.3	12,701	9,082	3,619	71.5	28.5
Kilowatt capacity	25,811,305	24,383,271	1,428,034	94.5	5.5	14,313,438	13,407,041	906,397	93.7	6.3
Output, kilowatt-hours, total	96,828,633,719	92,298,762,606	4,529,871,113	95.3	4.7	50,274,212,592	47,833,036,617	2,441,175,975	95.1	4.9
Generated	74,686,378,019	71,306,839,538	3,379,538,472	95.5	4.5	40,291,536,435	38,413,240,163	1,878,296,272	95.3	4.7
Purchased	22,142,255,709	20,991,923,068	1,150,332,641	94.8	5.2	9,982,676,157	9,419,796,454	562,879,703	94.4	5.6
Kilowatt-hours sold, total	79,011,210,518	75,344,545,709	3,666,664,809	95.4	4.6	41,964,785,034	39,912,345,239	2,052,439,795	95.1	4.9
To ultimate consumers	63,612,481,088	60,536,941,316	3,075,539,772	95.2	4.8	32,947,716,350	30,941,250,295	2,006,466,055	93.9	6.1
For resale	15,398,729,430	14,807,604,393	591,125,037	96.2	3.8	9,017,068,684	8,971,094,944	45,973,740	99.5	0.5
Number of customers	21,790,238	19,661,370	2,128,868	90.2	9.8	12,709,868	11,065,124	1,644,744	87.1	12.9

[1] Includes $902,057,279, value of plant and equipment owned by companies engaged in the operation of electric light and power plants and of other public utilities, not distributed among the several utilities. It is practically certain that more than half of this amount represents the value of plant and equipment properly chargeable to the electric light and power industry.

[2] Miscellaneous electric revenues, net income from utilities other than electric, and non-operating income. Does not include amount of rents credited to income nor amortization of franchises (called for as net items on the 1927 schedule).

[3] Not called for on schedule used for canvassing municipal plants in cities having fewer than 25,000 inhabitants. For expenses of municipal plants in cities having 25,000 inhabitants of more, see Table II.

[4] Operating expenses, interest, and other deductions from gross income. Does not include amount of rent payments for lease of plant, equipment, etc.

[5] Includes estimated value of free service, as follows: Total, $5,267,022; commercial $565,404; municipal, $4,701,618. The estimated value of free service was not reported for 1927.

Control of
Multiple Street Lighting

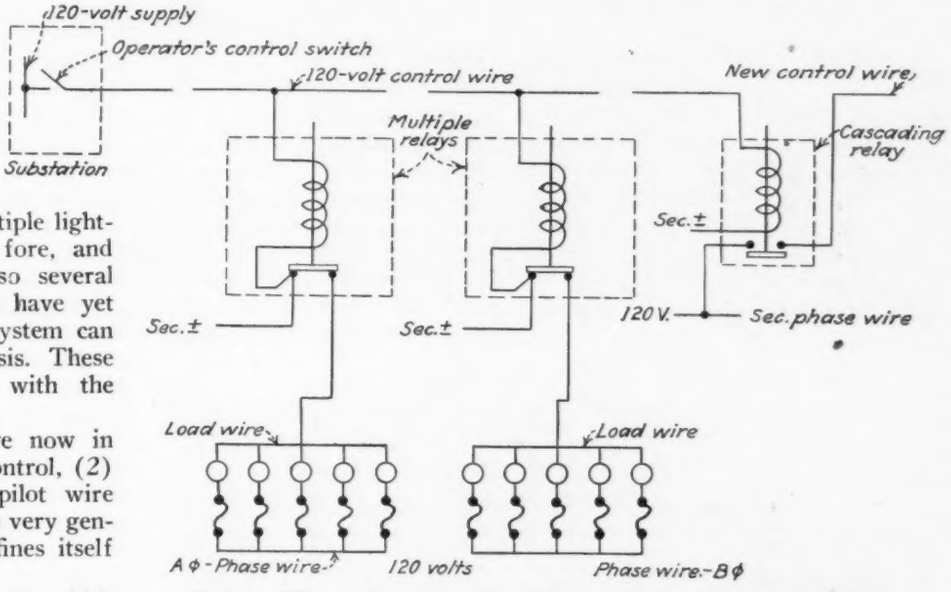
High inrush currents due to cold filaments cause problems. General considerations and development of pilot wire scheme to control multiple installations

By Robert W. Gillette
New York & Queens Electric Light & Power Company

FOR several years electric light and power companies have been putting under ground all conductors in the solidly built-up business and residential sections of the larger cities. Many are cutting over to a star-connected secondary network for both light and power. This program of going underground has taken street lighting along with it, and the desirability of saving duct space by putting these street lighting conductors in with the commercial secondary has pointed to the adoption of multiple street lighting with low potential control. Thus multiple lighting is rapidly coming to the fore, and with multiple lighting come also several problems and difficulties which have yet to be disposed of before this system can be said to be on a satisfactory basis. These problems arise in connection with the control of multiple lamps.

Three systems of control are now in use. They are: (1) Resonant control, (2) time switch control and (3) pilot wire control. The pilot wire control is very generally used, and this article confines itself to this method alone.

A pilot wire control scheme in which the control wire is energized during the day and de-energized during street lighting time is shown herewith. This has been found to be the most reliable system, since any fault which causes the control to become dead will result in no outage, but will, instead, light the lamps which it controls. The control wire originates in the substation, where a switch is located for the control of the lamps by the station operator. The control is at 120 volts potential, 60 cycles. The relays used on the system with which the writer is most familiar are rated at 2,500 watts, this size having been found to be the most desirable from an economic standpoint. The operating coil of each relay is connected between the control wire and the secondary neutral. The limiting factor governing the number of relays which may be connected to the control wire is, of course, the distance of the relay from the source of control-wire potential. When the control-wire voltage has dropped to about 105 volts a new supply must be obtained. This supply is picked up from a convenient transformer by means of a normally open relay, as shown in the figure. This cascading may be carried on indefinitely. It is considered impracticable to cascade more than six or seven times, however, since many lamps would then be affected by a fault near the substation.

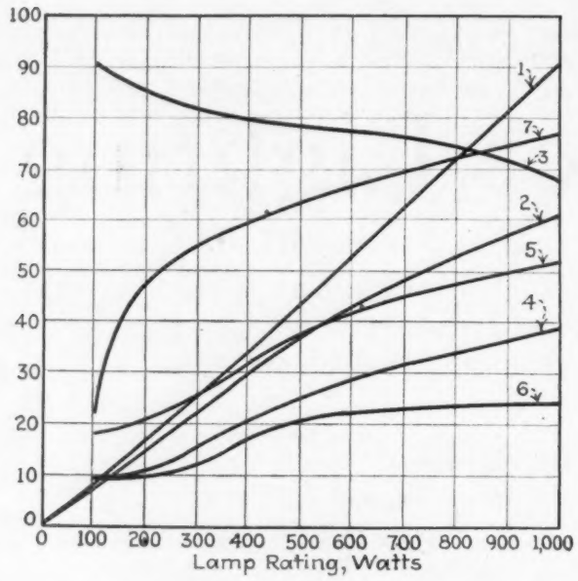


Pilot Wire Scheme for Energizing Control Wire During the Day and De-energizing It at Night

This system of control is a good one; the difficulties which arise are connected with the securing of relays which will provide reliable service. The chief obstacle with which relay manufacturers are confronted is the design of contacts which will stand the heavy inrush current to cold lamps.

Lamp Load Characteristics

In order to obtain data on the characteristics of lamp loads at the instant of the closing of the circuit oscillograms were taken. The sizes of lamps used are those most frequently employed for street lighting work. The values taken from these oscillograms appear in Table I,



Oscillographic Data on Gas-Filled Tungsten Street Lights

Normal current—curve 1—scale × 10^{-1}.
Peak current—curve 2—scale × 1.
Ratio maximum to normal current — curve 3 — scale × 10^{-1}.
Time to reach peak current, seconds — curve 4 — scale × 10^{-4}.
Time to reach double normal current — curve 5 — scale × 10^{-3}.
Time to reach normal current—curve 6—scale × 10^{-3}.
Per cent initial decrease in volts—curve 7—scale × 1.

and for purposes of comparison they have been plotted as shown above. A word of explanation is necessary to support these data. A 5-kw. direct-current generator was used as the source of the energy input to the lamps. Although in actual practice the supply would be alternating current, the differences in characteristics from the values obtained would be so slight as to be negligible. Experiments by others have shown that the time for the alternating current to assume a normal value was identical with the time required for direct current to reach its normal value.

Measurements of the hot and cold resistances of the lamp filaments gave an average ratio of fifteen to one. Actual measurements of current from the oscillograms however, show the highest ratio of maximum current to normal current to be nine to one for the 100-watt lamp and only seven to one for the 1,000-watt lamp. This may be explained by the fact that since the resistance of the filament is so low, the initial current rise is extremely rapid; this produces a reactance drop in the line, and with the resistance drop in the lines the voltage at the lamp is greatly reduced. The decrease in voltage at the instant of making the circuit ranges from 22 per cent to 77 per cent of the open circuit values. Part of this effect is caused by the regulation of the machine supplying the energy. In some of the oscillograms taken the voltage appears to drop to zero, but this is believed to have been caused by the overshooting of the oscillograph element.

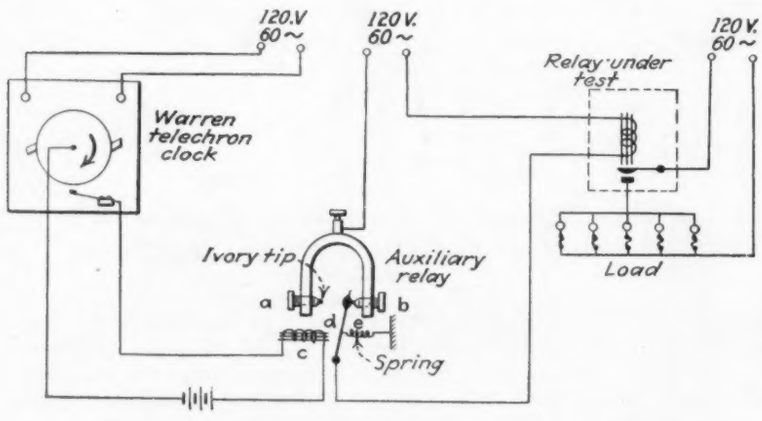
Table I—Lamp Characteristics from Oscillograms

Lamp Rating	Current			Resistance Ratio	Time			Voltage
	Normal	Peak	Ratio Maximum to Normal	Hot Resistance to Cold Resistance (Approx.)	To Peak Current	To 2 x Normal Current	To Normal Current	Decrease Initially from Open Circuit Voltage
Watts	Amp.	Amp.			Sec.	Sec.	Sec.	Per Cent
100	0.84	7.6	9.1	14.8	0.0008	0.018	0.091	22
200	1.68	14.2	8.5	15.5	0.0010	0.021	0.109	48
300	2.62	21.3	8.1	16.0	0.0016	0.025	0.115	55
500	4.32	37.5	8.7	15.9	0.0026	0.038	0.215	66
750	6.70	50.4	7.5	15.9	0.0032	0.046	0.232	71
1,000	9.02	61.3	6.8	16.1	0.0039	0.052	0.245	77

In practice, a source of supply with better regulation might give a ratio of ten to one on inrush current. Whether this is obtained or not, it is an established fact that a destructive value of current is encountered. Since the heating varies with the time and the squared value of this current the record of failures of relays employing only metal contacts will not appear surprising. The metal contacts often fuse together so that the lamps cannot be extinguished. Even if this does not happen, the contacts will become so burned and pitted as to render the relay unfit for service.

Some other effects of the heavy inrush current which have been observed in actual practice are the overheating of strip and spiral springs used to close or maintain pressure on contacts with the consequent loss of temper and the melting of insulating compound on the operating coil. Examination of many relays which have failed in service has shown that these last-mentioned effects are responsible for a surprising percentage of the failures.

A study was made as a result of the many relay failures, due to the above causes, to determine the requirements of a satisfactory relay to control multiple lamp loads. Five relays were obtained from five different manufacturers to perform this duty. The relays secured were not all of the same load rating, but each was tested at



Wiring Diagram of Scheme Used to Make Life Tests on Relays

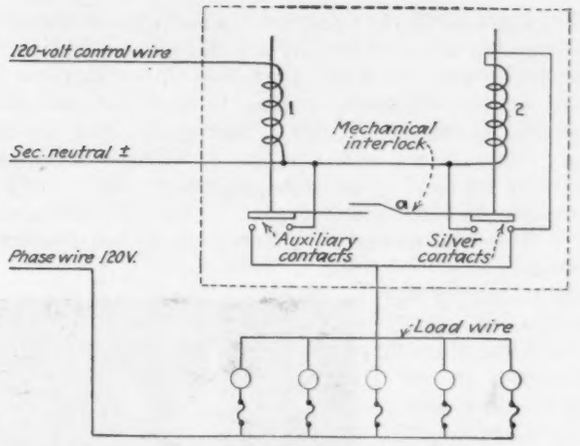
The Warren telechron movement has its second hand replaced by an aluminum disk carrying two contacts. As each of these comes to the bottom position the circuit of the auxiliary relay is completed for an interval of about 1.5 seconds. The coil (*c*) pulls armature (*d*) away from contact screw (*b*) to a position against screw (*a*). Screw (*a*) has an ivory insulating tip so that the control circuit of the relay under test is broken and its contacts close, lighting the lamps which are under investigation.

When the disk has rotated sufficiently to break the auxiliary relay control circuit spring (*e*) pulls armature (*d*) back to its former position against screw (*b*). The control coil of the relay under test is thus energized again and the lamps are extinguished.

Although three separate sources of 120-volt, 60-cycle current are shown in the figure, a single source can be used for all three purposes.

Table II—Multiple Relay Test Data

Relay Number		Coil Characteristics									Test on Contacts											
		Sealing and Drop-out				Inrush			Operating				Max. Temp. Rise Deg. C.	Dielectric Test	Operation			Life (To Approximate Eight Years)				
		Volts	Amps.	Watts	P. F.	Volts	Amps.	Watts	P. F.	Volts	Amps.	Watts	P. F.			Lamp Load Watts	No. of Operations	Remarks	Lamp Load Watts	No. of Operations	Remarks
I.	Sealing	84.0	0.180	9.0	0.59	120.0	0.351	29.0	0.69	110.0	0.097	3.0	0.28	28	OK	3,000	25	Badly pitted			
	Drop-out	64.0	0.035	0.5	0.22					115.0	0.108	3.8	0.31								
										120.0	0.114	4.5	0.33								
II.	Sealing	52.0	0.290	7.4	0.49	100.0	0.570	30.5	0.33	100.0	0.136	6.5	0.47	61	OK	3,000	25	Very slightly pitted	3,000	3,000	No failures. Aux. contacts badly pitted. Main contacts somewhat pitted.
	Drop-out	20.0	0.023	0.3	0.65	110.0	0.610	35.0	0.52	110.0	0.165	8.2	0.45								
						120.0	0.675	43.0	0.53	120.0	0.185	10.	0.45								
III.	Sealing	81.0	0.051	2.1	0.51	110.0	0.084	5.3	0.58	110.0	0.032	2.1	0.60	18	OK	2,500	25	Badly pitted	2,500	3,000	Seventeen failures. First failure after 30 operations.
	Drop-out	63.0	0.018	0.6	0.53	120.0	0.090	6.0	0.57	120.0	0.036	2.5	0.58								
IV.	Sealing	59.0	0.176	3.1	0.30	100.0	0.340	10.7	0.31	100.0	0.185	6.2	0.34	33	OK	2,000	25	Badly pitted			
	Drop-out	28.0	0.044	0.4	0.32	110.0	0.384	13.7	0.32	110.0	0.214	8.0	0.34								
						120.0	0.452	16.0	0.30	120.0	0.244	10.0	0.34								
V.	Sealing	88.0	0.113	3.35	0.34	100.0	0.132	4.50	0.34	100.0	0.097	4.50	0.46	41	OK	3,000	25	Very slightly pitted	3,000	3,000	No failures. Contacts in excellent condition.
	Drop-out	49.0	0.044	1.10	0.51	110.0	0.148	5.50	0.34	110.0	0.108	5.51	0.46								
						120.0	0.158	7.00	0.37	120.0	0.118	6.60	0.46								

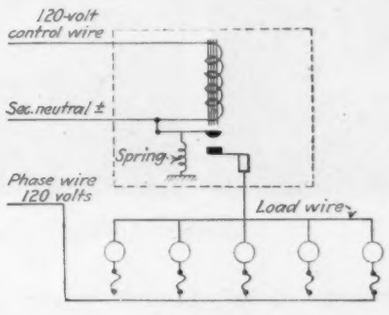


Relay with Two Types of Contact Serves Double Purpose

At starting time coil 1 becomes de-energized, allowing the copper-to-carbon contacts to close, making the load circuit and short circuiting coil 2. Coil 2 is thus de-energized and the silver contacts close to carry the normal current. At extinguishing time coil 1 is energized, opening the copper-to-carbon contacts. By means of the mechanical interlock afforded by bar (*a*) the silver contacts are opened by coil 1 also, just after the copper-to-carbon ones have opened. The load circuit is thus broken and coil 2, now becoming energized, holds the silver contacts apart until the next starting time.

its full rated load in order that its suitability for the job for which it was designed might be determined. Each relay was tested for its coil characteristics, dielectric strength, temperature rise and operating characteristics. The load used in the operation test was composed of gas-filled tungsten lamps. On several of the relays which possessed some desirable characteristics life tests were made. The set-up used in the life test was designed to simulate the conditions encountered in the field. As in the other tests a tungsten lamp load was used, and in order that the lamps might have time to cool between operations a cycle of two operations per minute was decided upon. The circuit was closed for 1.5 seconds and then opened for 28.5 seconds before the next operation. The lamps were thus allowed to reach full incandescence and then given ample time to return to a temperature only slightly higher than room temperature.

To time the operations a Warren telechron clock movement was used, the second hand having been replaced



Schematic Arrangement for Multiple Relays

The contacts are held open by the coil and may be closed when the coil is de-energized, either by gravity, as in the case of relays II and IV, or by springs, as in relay I, or by a combination of both, as in relay III.

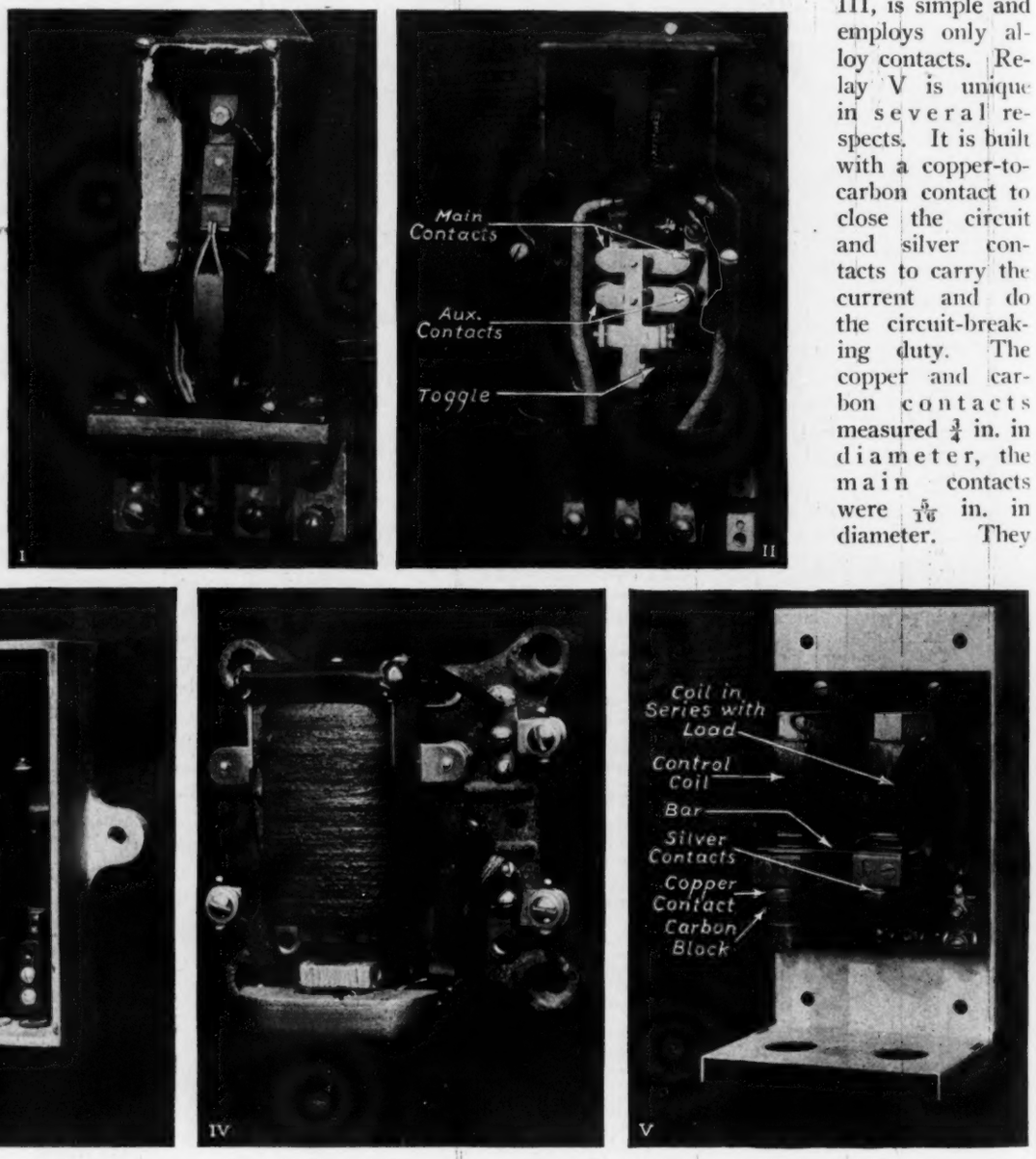
by an aluminum disk carrying two contacts. An auxiliary contacting relay operated from dry cells was used, since it was not desired to have the delicate clock mechanism carry the heavier contacts in the test relay control circuit. The armature of the auxiliary relay was held against a contact screw (*b*) in the horseshoe-shaped yoke shown, on page 420, by a spring, which kept the test relay control circuit energized during the "out" period. When the clock movement closed the auxiliary circuit the arma-

ture of the auxiliary relay was pulled against the screw (*a*) on the other extremity of the yoke. This screw was fitted with an ivory insulating tip so that the test relay control circuit was thus broken and the lamps lighted. There is a further advantage in using the auxiliary relay shown in the figure, in that the set-up may easily be changed to control a "normally off" circuit by merely interchanging the screws (*a*) and (*b*) in the yoke. If it is desired to make a greater number of operations per minute it is only necessary to affix more contacts to the aluminum disk on the clock movement. The number of operations may be recorded by attaching a counter to the relay or, if the time during which the test is running is known, the number of operations can easily be calculated.

For the purpose of publishing the results of the tests the relays are designated as I, II, III, IV and V, corresponding with the accompanying illustrations.

For clearness it may be well to mention the distinctive features of each relay, as these are not all apparent in the illustrations. Relay I was equipped with only copper contacts, which were held closed by springs when the coil was not energized. An ingenious bit of design gave the contacts a very good wipe which had the tendency to make them self-cleaning.

Relay II was provided with auxiliary carbon arcing contacts which closed the circuit and broke the circuit. The operating mechanism consisted of a plunger in a solenoid, controlling the arm which carried the contact bars through a toggle linkage. The toggle design has the advantage of "locking" the contacts together when in the closed position and prevents any chattering. Springs maintain pressure on the contacts. Relay III is the simplest design of all and the illustration needs no explanation. Only silver alloy contacts are provided, the movable one being carried on a strip of spring metal. Relay IV, like III, is simple and employs only alloy contacts. Relay V is unique in several respects. It is built with a copper-to-carbon contact to close the circuit and silver contacts to carry the current and do the circuit-breaking duty. The copper and carbon contacts measured $\frac{3}{4}$ in. in diameter, the main contacts were $\frac{5}{16}$ in. in diameter. They are closed by gravity alone, there being no springs in the relay. A rather detailed descripiton is necessary to show how the proper sequence of operations is accomplished.



Circuit Opening Street-Lighting Relays

The nature of the electrical circuit in this relay is shown on page 421. There are two operating coils; the one shown at the left (1), whose armature carries the copper contact, is connected in the usual manner, from the control wire to the secondary neutral. The other coil (2), controlling the silver contacts, is connected, when both contacts are open, from the load wire to neu-

tral. It is energized through the load, and when the carbon-to-copper contacts are closed is short-circuited. A bar of metal (*a*) mechanically interlocks the contacts so that when both contacts are closed and coil (1) is energized its armature picks up and mechanically breaks the other contact by lifting that armature. When both contacts are open coil (2) becomes energized and picks up its armature, relieving coil (1).

The cycle of operations is as follows: During the daytime both coils are energized, the contacts are open, the lamps out. When the control wire is de-energized armature (1) drops, lighting the lamps and shorting out coil (2). Armature (2) then drops to provide the low-resistance main contact. At extinguishing time coil (1) first becomes energized and picks up armature (1). When the carbon-to-copper contact is opened the bar lifts the silver contact, breaking the circuit and extinguishing the lamps. Coil (2) is now energized and holds armature (2) until the next cycle of duty.

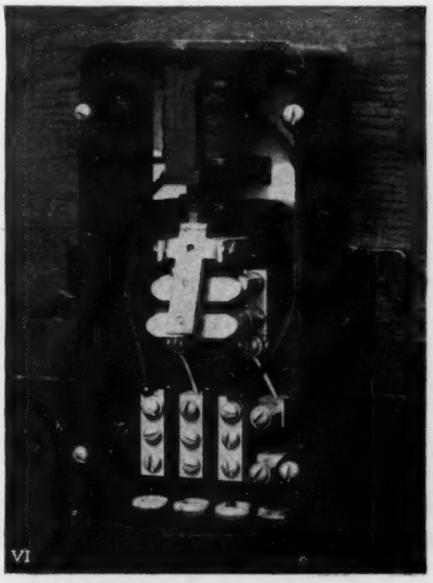
The results of the complete tests are given in Table II. The coil characteristics require no comment. It is of course desirable that the inrush current to the coil be kept low, and while there is a considerable range even in these five relays, in no case is the inrush current high enough to cause the rejection of the relay on those grounds. Since the control voltage is never allowed to drop below 105 volts before a new supply is picked up by cascading, the highest value of sealing voltage obtained in these tests, 88 volts, is likewise no cause for alarm. One point must here be considered, however; if the contacts should fuse together, due to the heavy inrush current to the lamps the voltage required to break the contact will be a higher value than the sealing voltages recorded. This will be mentioned again in the discussion of the life tests.

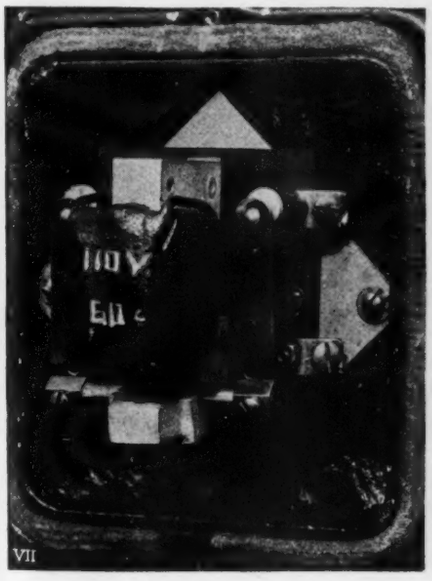
Again in the case of temperature rise all relays passed the test satisfactorily, the highest rise being 61 deg. C. for relay II. An insulation break-down test was made in accordance with the A.I.E.E. Standards (number 15, paragraph 300) and all relays were well within the specified limits.

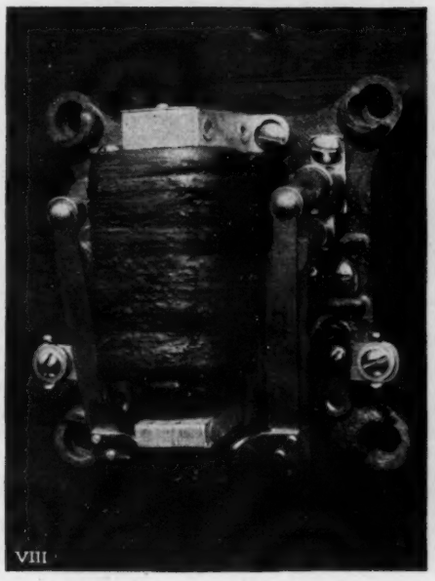
The most important tests that were made were the tests on the contacts. The five sample relays were given 25 operations under their rated loads and the condition of the contacts noted. These results are to be found in the table. It was found that those relays having carbon auxiliary contacts were in much better condition than those provided with metal contacts alone. Further, the copper contacts of relay I had suffered more than those employing silver alloy contacts.

The final test was the life test on the three relays which seemed most likely to satisfy all the requirements of street lighting control duty. Relay II operated satisfactorily on life test. The auxiliary silver contacts which closed to the carbon blocks were considerably burned, pitted and frayed at the edges, but the relay was still fit for service. The main contacts were somewhat pitted, also, but this pitting was insufficient to cause rejection. No failures during 3,000 operations.

Relay III did not fare so well; the silver contacts, being required to carry the inrush current, rapidly began to become pitted and roughened so that a good contact surface no longer existed. After 30 operations (in addition to the 25 operations of the preceding operation test) the contacts fused together. The test was not disturbed this time and after four cycles the magnet succeeded in breaking the contacts apart. Under actual field conditions, this failure would have meant the removal of the relay, since one cannot afford to energize and de-energize the control wire affecting many other relays than the one


VI


VII


VIII

IX

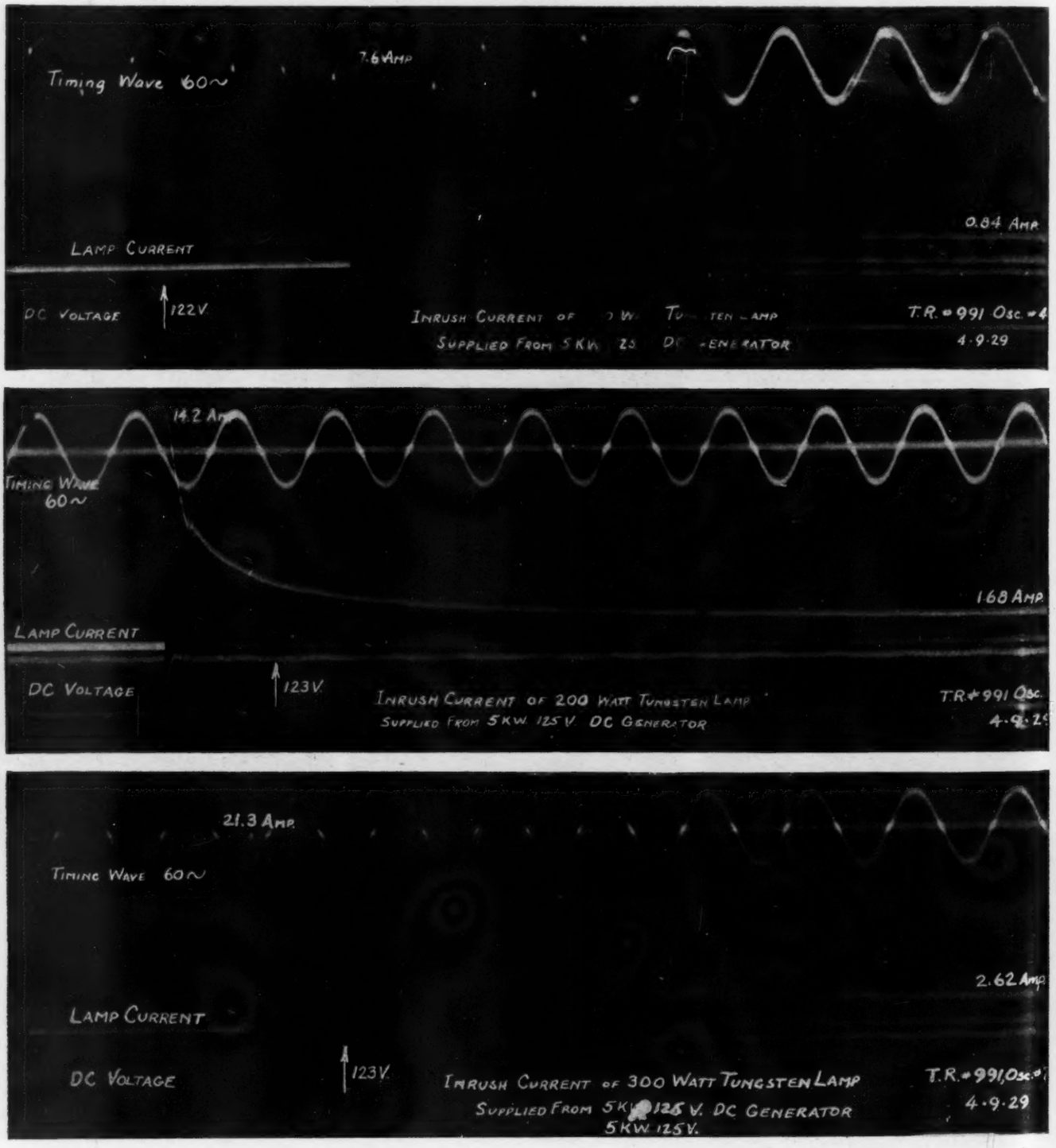
Circuit Closing Street-Lighting Relays

concerned, even if the substation operator had means of knowing that the relay had failed to open.

This relay failed many more times during the 3,000 operations, the contacts having to be broken usually by the tester. Each failure was occasioned by the welding together of the contacts; in none of the tests was the operating mechanism the cause of a failure.

Relay V emerged most successfully from the test. No failures occurred and the contacts were in excellent condition, there being only the slightest pitting of the silver contacts, and relatively slight pitting of the copper contact which closed to the carbon block.

One point might here be noted with regard to relays II and V. Both were provided with carbon block contacts. In the case of relay II, however, the contacts were considerably smaller than those of relay V, and the pitting of II was considerably greater than that of V. This is not accounted for so much by the size of the contacts, however, as by the fact that the mechanism of II was such that contact was always made first on the edges of the silver-to-carbon contacts. The auxiliary contacts of V closed on nearly the entire surface of the contacts, so that the effect of the arcing was distributed over the surface rather than being more destructively centered on any one spot. It is believed that relay V is capable of carrying 5,000 watts without changing the



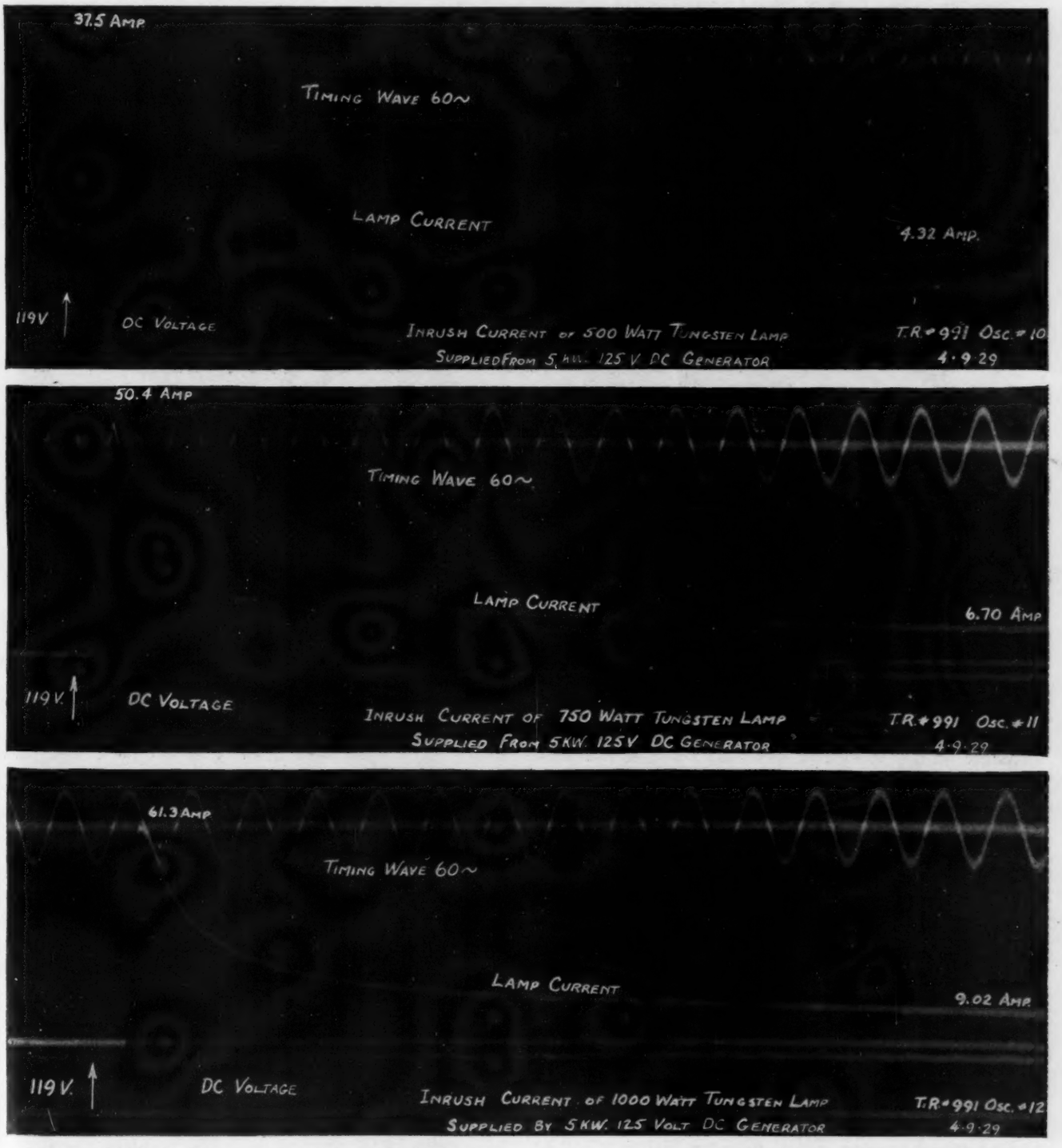
Oscillograms Showing Characteristics

design, although no tests were made with such large loads.

The tests do establish definitely one fact; relays which are to be required to control a load of the magnitude of 2,000 watts must be provided with auxiliary contacts, to secure the most reliable service. Some manufacturers in their designs have the carbon contacts both make and break the circuit, others use the carbon merely for making the circuit. The breaking duty is very light by comparison with the making duty and in the tests conducted the relay V, which broke the circuit on the silver contacts, showed contact surfaces to be in excellent condition.

Although the trouble occasioned by cascading relays is small in proportion to that caused by the failures of the multiple relays discussed above, yet careful consideration must also be given to the selection of relays for this duty. A failure of a cascading relay near the substation may mean that many lamps will fail to light at starting time or remain lighted at extinguishing time. Both of these results of the failure of a relay are costly and must be guarded against in so far as possible.

The conditions under which the cascading relays operate are somewhat different from those affecting a multiple relay. The chief difference is the type of load controlled. There is not the troublesome inrush current which was shown to be so destructive to relay contacts.



of Gas-Filled Tungsten Street Lights

Instead there is an inductive load which offers little difficulty. The construction of these relays may provide only metal contacts without particular fear of failure. The contacts are normally open and are closed by the energizing of the control wire. The cascading relays used by the company with which the writer is most familiar are of either 15 amp. or 25 amp. rating. The 25-amp. relays are provided with carbon auxiliary contacts and the 15-amp. relays use only silver alloy contacts. The coil characteristics are practically the same as for their respective counterparts in the multiple relay group. Some common types of cascading relays are shown in the illustrations on page 423.

There are some further considerations anent multiple street lighting control that have not yet been mentioned. Good moisture-proof cases should be provided to contain the relays. Moisture and dirt can cause many failures if proper measures to exclude them are not taken. Ornamental lamp-posts often impose limitations in the size of the relay case. For purposes of standardization all relays should be designed to fit inside the smallest size lamp-post used.

Direct current which may find its way onto the control wire from the lines of a street railway company is apt to prove extremely troublesome. A coil will hold its armature on d.c. voltage of less than 1 volt in many instances. If the direct current cannot be eliminated, a few small condensers in the control wire will satisfactorily solve the difficulty. In sections of particularly heavy load density on the electric railroad it may be necessary to install a condenser with each relay.

If any overhead control wire is in existence it is important that adequate lightning protection be insured. An arrester should be installed at each cascading relay, the resistance to ground being well down below 25 ohms.

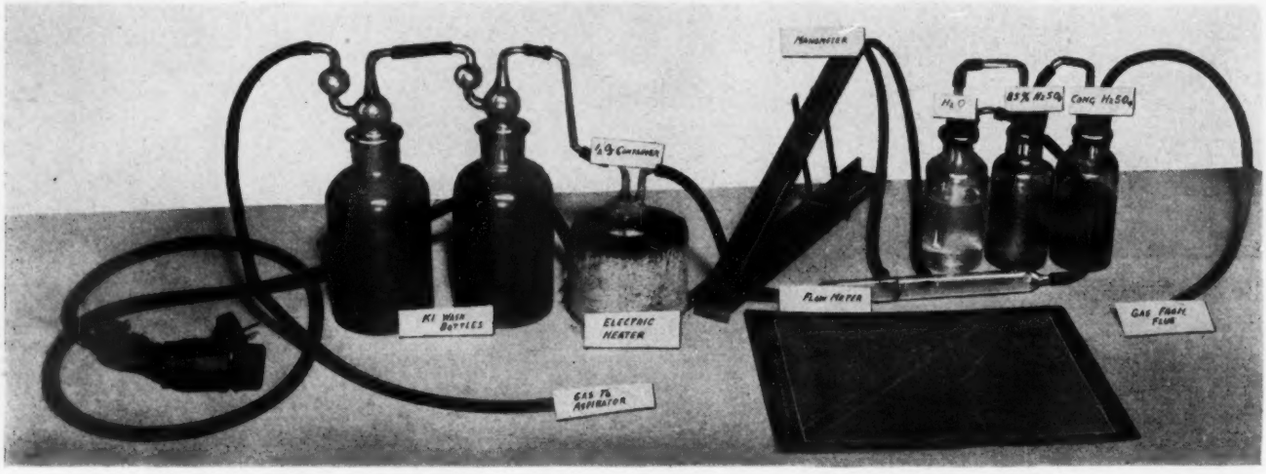
Generally speaking, the use of springs on relays is to be avoided wherever possible. Contacts closed by gravity are more reliable.

These are the main considerations to be borne in mind when planning a multiple lighting installation and selecting the apparatus for its control. Unusual problems may arise with a particular installation due to special conditions with which the utility has to cope, but the bugbear of high inrush current to cold tungsten filaments will be present in every multiple installation. Carbon auxiliary contacts are the solution to that difficulty and are strongly recommended. Avoid the use of springs, provide against lightning, guard against stray d.c. voltage on the control and 90 per cent of the failures will be forestalled.

Integrated CO Test Checks Stoker Operation

By Irvin G. McChesney
Superintendent Power Testing Section
Rochester (N. Y.) Gas & Electric Corporation

IN RECENT tests of a traveling grate stoker-fired boiler the problem of reducing carbon monoxide presented itself, and as analyses for carbon monoxide are unreliable unless made by skilled chemists, or operators thoroughly acquainted with precautions necessary for accuracy, a special integrating device was prepared for the carbon monoxide determinations.



Carbon Monoxide Integrator for Checking Furnace Operation

Gas taken from the last pass of the boiler is washed in sulphuric acid to remove illuminates and sulphides, then remoistened by passing through water. The sample is then passed through a glass flow meter consisting of a glass tube with a nozzle plate and pitot connections to an inclined manometer. The nozzle diameter of this integrator is 0.033 in. and passes 90 grams of gas per hour at 72 deg. F. and a head of 2.3 in. of water. Calibration of the flow meter is made by air through a precision gas meter.

Gas passes from the flow meter into the iodine pentoxide container, where, being released through several small holes buried under approximately $\frac{3}{4}$ in. of reagent, it is allowed to pass out of the container. The iodine pentoxide unites with carbon monoxide, liberating free iodine. In the following washes of potassium iodide all of the free iodine is cought.

Chemical analysis gives the exact amount of free iodine recovered over the period of operation of the integrator, and from these data, flow of sample in grams per hour, time of operation and free iodine recovered, the average carbon monoxide content may be computed accurately. The reaction described requires a temperature somewhat above the boiling point.

Utility Plants Add 2,000,000 Kw. Annually

Public utility plants have 29,629,702 kw. generating capacity; 71.6 per cent driven by steam, 27.4 per cent by water, 1.0 per cent by internal combustion engines

THE installed capacity of generators in public utility plants in the United States as of January 1, 1929, was 29,629,702 kw., of which 21,214,580 kw. was driven by steam, 8,116,627 kw. by water power and 298,495 kw. by internal combustion engines, according to a recent report of the U. S. Geological Survey. This capacity is contained in 3,795 plants, operated by 1,720 companies. Corresponding figures for individual states are given in Table I.

In comparing these data with those published by other agencies several considerations need to be borne in mind. The Geological Survey includes in its monthly and annual returns on energy output and in its tabulation of plants not only those for electric light and power, municipal as well as commercial, but also electric railway plants, plants operated by steam railroads generating electricity for traction, Bureau of Reclamation plants and that part of the production of electricity by manufacturing plants which is sold for public use. The capacity of the generators and the output of electricity of the two last-named types are comparatively small. Comparison of the returns of the census of Electric Light and Power Companies for 1927, published in the ELECTRICAL WORLD of April 6, 1929, on page 709, with figures for the corresponding date as given in Table II, shows that the non-central-station plants had a capacity somewhat in excess of 2,000,000 kw. This capacity is changing very slowly.

Table II—Public-Utility Power Companies in the United States and Capacity of Generators, January 1, 1927 and 1928

Division and State	1927 Operating Companies	1927 Plants	1927 Capacity of Generators (Kilowatts)	1928 Operating Companies	1928 Plants	1928 Capacity of Generators (Kilowatts)
United States	2,058	3,805	25,398,385	1,820	3,740	27,690,891
New England	185	338	2,358,939	168	330	2,466,705
Middle Atlantic	256	468	6,646,142	214	436	7,113,361
East North Central	414	786	5,925,149	361	735	6,311,870
West North Central	422	706	1,886,186	387	682	2,008,224
South Atlantic	253	412	2,835,074	223	429	3,475,795
East South Central	110	196	1,221,372	104	200	1,330,756
West South Central	176	339	910,056	142	385	1,079,940
Mountain	151	277	877,911	139	274	975,419
Pacific	91	281	2,737,556	82	269	2,928,821

A further difference between the several sets of figures lies in the exclusion, by the Geological Survey, of plants of less than 100 kw. This greatly reduces the number of plants listed, but does not seriously affect the total rating, and materially expedites the process of compiling the Survey's monthly statistics of energy output and fuel consumption. Moreover, the present figures on operating companies necessarily exclude those purchasing all their energy and not operating any power plants, hence the number is smaller than the total number of electric light and power companies.

The Middle Atlantic States lead in capacity, with 7,406,027 kw. Next comes the East North Central division with 6,754,252 kw. and then the South Atlantic with 3,754,343 kw.

The increase in total rating during 1927 was 2,292,506 kw.; during 1928 it was 1,938,811 kw. The totals by regions for the two preceding years are given in Table II.

The apparent difference of growth in 1927 and in 1928 is probably of little significance, since a month's

Table I—Generator Capacity of Public Utility Power Plants

Division and State	January 1, 1929 Operating Companies	Plants	Capacity of Generators in Kilowatts — Operated by: Steam Power	Water Power	Int. Comb. Engines	Total
United States	1,720	3,795	21,214,580	8,116,627	298,495	29,629,702
New England	173	329	1,942,967	607,038	6,090	2,556,095
Middle Atlantic	197	424	6,131,286	1,260,086	14,655	7,406,027
East North Central	333	705	6,150,345	585,949	17,958	6,754,252
West North Central	371	691	1,668,656	315,948	83,454	2,068,058
South Atlantic	200	433	2,127,751	1,590,889	35,703	3,754,343
East South Central	91	222	646,508	836,417	14,357	1,497,282
West South Central	146	434	1,118,026	17,034	103,558	1,238,618
Mountain	131	281	275,704	677,726	19,365	972,795
Pacific	78	276	1,153,337	2,225,540	3,355	3,382,232
New England						
Maine	31	73	37,114	155,726	517	193,357
New Hampshire	19	45	38,220	62,872	743	101,835
Vermont	35	71	10,460	159,849	0	170,309
Massachusetts	58	91	1,155,368	147,311	2,840	1,305,519
Rhode Island	5	8	245,975	1,750	0	247,725
Connecticut	25	41	455,830	79,530	1,990	537,350
Middle Atlantic						
New York	96	253	3,115,937	1,039,127	4,261	4,159,325
New Jersey	17	30	663,045	9,250	2,100	674,395
Pennsylvania	84	141	2,352,304	211,709	8,294	2,572,307
East North Central						
Ohio	78	121	1,829,229	13,695	2,609	1,845,533
Indiana	59	112	645,119	39,679	2,070	686,868
Illinois	63	124	2,127,905	44,300	5,542	2,177,747
Michigan	71	170	1,064,580	254,599	2,706	1,321,885
Wisconsin	62	178	483,512	233,676	5,031	722,219
West North Central						
Minnesota	60	117	327,155	152,936	4,137	484,228
Iowa	67	141	313,989	124,325	10,557	448,871
Missouri	58	97	456,620	15,050	15,585	487,255
North Dakota	14	36	45,412	0	1,646	47,058
South Dakota	23	55	39,693	4,511	8,180	52,384
Nebraska	62	122	161,937	10,006	16,057	188,000
Kansas	87	123	323,850	9,120	27,292	360,262
South Atlantic						
Delaware	7	7	31,735	0	280	32,015
Maryland	18	25	336,083	272,196	1,268	609,547
District of Columbia	3	3	166,500	3,000	0	169,500
Virginia	30	72	329,010	76,374	2,856	408,240
West Virginia	19	46	508,907	56,175	4,945	570,027
North Carolina	30	74	219,170	537,727	940	757,837
South Carolina	21	45	117,511	373,080	365	490,956
Georgia	33	83	91,434	266,637	374	358,445
Florida	39	78	327,401	5,700	24,675	357,776
East South Central						
Kentucky	20	57	232,205	104,640	2,125	338,970
Tennessee	31	57	184,695	140,302	2,514	327,511
Alabama	18	47	180,142	591,475	2,249	773,866
Mississippi	22	61	49,466	0	7,469	56,935
West South Central						
Arkansas	21	70	76,003	10,116	5,347	91,466
Louisiana	25	44	136,267	0	10,616	146,883
Oklahoma	52	103	253,674	1,725	28,688	284,087
Texas	48	217	652,082	5,193	58,907	716,182
Mountain						
Montana	12	31	9,753	215,588	535	225,876
Idaho	19	45	1,960	222,270	0	224,230
Wyoming	21	34	30,702	10,501	2,787	43,990
Colorado	28	56	155,451	56,120	350	211,921
New Mexico	14	23	22,142	460	2,456	25,058
Arizona	13	28	19,696	68,448	10,632	98,776
Utah	19	54	36,000	95,229	1,215	132,444
Nevada	5	10	0	9,110	1,390	10,500
Pacific						
Washington	24	67	109,647	496,001	295	605,943
Oregon	22	58	116,895	150,308	865	268,068
California	32	151	926,795	1,579,231	2,195	2,508,221

shift in the date of starting a few large units would fully account for it. Similarly, the slight decrease in the Mountain States last year, after a recorded rise of 11 per cent in 1927, probably signifies merely that some old installations of small capacity were not immediately dismantled after being rendered superfluous by additions elsewhere.

Copper Costs Cut 25 per Cent by Use of Bare Wire

AN AVERAGE saving on a number of distribution systems would be about 25 per cent in cost of copper conductors if bare wire were used instead of triple-braid weatherproof wire, stated M. C. Miller, distribution design engineer of the Texas Power & Light Company, at the recent regional meeting of the American Institute of Electrical Engineers at Dallas, Texas.

The installation costs of bare wire as compared to triple-braid weatherproof do not vary directly with the weight. On short extensions of one or two or three spans the labor costs would be about equal with some savings up to 15 per cent or 20 per cent on longer lines where the lesser weight of bare wire saves on transportation splicing and setting up reels, etc.

Construction men who have been installing and maintaining bare copper conductors for lighting and power secondaries, series street-lighting circuits and primaries, 2,300 volt to 12,000 volt, express a very definite preference for it, Mr. Miller declared.

To operate satisfactorily it must be put up right, sagged correctly and guyed sufficiently, but once put up right it does not stretch and cause excessive sag which periodically must be pulled up or resagged, resulting in a large saving in maintenance costs.

No increase in horizontal spacing is necessary as the smaller sag required for bare conductors reduces the possibility of their swinging together. It has been found desirable, however, to provide additional vertical spacing where bare conductors are installed on vertical secondary racks and 12-in. separation eliminates any possibility of conductors getting together. Eight-inch spacing has been used in many places with no report of trouble from this cause. This increased spacing uses up a foot more of pole height, but very seldom requires a 5-ft. higher pole.

To give a comparison of cost for conductors of the sizes most frequently used in distribution circuits the following costs per 1,000 ft. of bare and weatherproof wires are calculated, assuming bare at 20 cents and weatherproof at 22 cents per pound:

					Per Cent
No. 6 Solid W. P.	$24.64	No. 6 Solid bare	$16.00	Saving $8.64	35
No. 4	36.08	No. 4	25.20	10.88	30
No. 2 Str. W. P.	59.04	No. 2 Str. bare	41.00	18.40	31
No. 1/0	93.04	No. 1/0	72.40	20.88	22
No. 4/0	176.00	No. 4/0	130.60	45.40	26

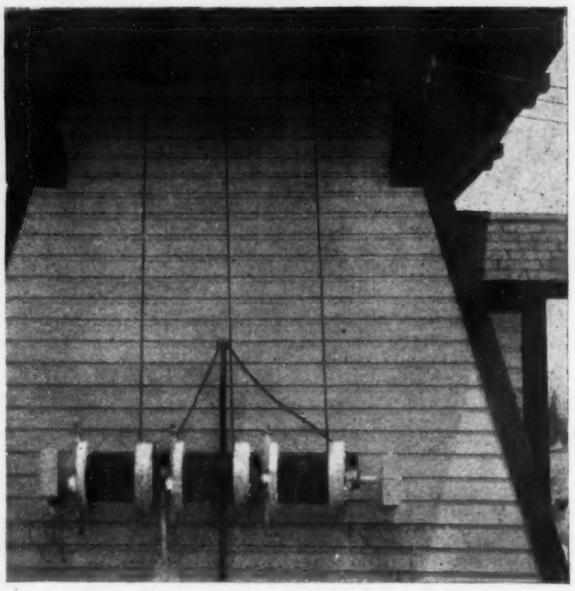
Comparative estimates for constructing an 11-kv. distribution system in a small town to serve 60 customers show a saving of 9.5 per cent in total construction cost by using bare in place of weatherproof wire. The saving in cost of conductors is 30 per cent, poles 9.4 per cent and labor 5 per cent. An estimated cost of a mile of No. 4 weatherproof medium hard drawn copper three-phase, 2,300-volt line using 35-ft. poles spaced 200 ft. is $1,625; No. 4 medium hard drawn bare using 35-ft. poles spaced 300 ft. is $1,133, or a saving of $492 or 30 per cent in total cast of bare as compared with No. 4 weatherproof conductors.

Among the advantages named by Mr. Miller in using hard-drawn bare wire are:

Life of conductors is conservatively three or four times that of weatherproof; practically no depreciation occurs in conductors; when salvaged they have practically the same value as new; hazard to linemen is not increased as they are necessarily more careful; hazard to general public is greatly reduced as lines do not break as frequently, and general appearance is greatly improved.

Take-Up Reels for Service to Floating Customer

VARIATIONS as great as 40 ft. in the water level of the Ohio River offered a problem to the Louisville Gas & Electric Company in arranging to supply electric service to the floating U. S. Coast Guard station on the levee in that city. To avoid the danger of loose wires on the top of the station as well as to keep the levee clear of poles or supports it was necessary to make some unusual provisions.



Utility Service Brought to Floating Station Through Adjustable Reels

Conductors running from a pole at the top of the levee to the station allow a variation in length from a few feet to 365 ft., corresponding to high and low water extremes and station positions. The wires pass over pulleys at the station end and then are attached to take-up reels as shown in the accompanying illustration. The reels are of wood with a brass bearing, to which the end of the wire coming to each reel is connected. The wooden axle on which the reels revolve is stationary, but is provided with three sections of copper sheathing on which the reels revolve, thus making direct contact. Each sheathing extends far enough beyond the reel to enter a split wood separator, through which connection is maintained to the station conduit.

Can WELDING *Jump the Hurdles?*

Electric welding of structures must reckon with difference in joint stress-distribution, with mill organization for fabrication of shapes, the designing engineer, the erection engineer and the riveter-welder

By J. E. TONNELIER

Civil Engineer, J. G. White Engineering Corporation, New York

THERE is ample evidence that the acceptance of electric arc welding as a structural medium has been both generous and general and that its progress has been as rapid as its development could warrant, and especially so when one considers how really inadequate it still is as a medium for structural steel design. We are living in an age when the needs of life are most exacting and when the most exacting needs are filled so casually as to make us forget the cost in hard labor and intensive thinking and time that form the background of the many things we take so literally for granted. We are inclined to be impatient of the time required to fill our ever-increasing needs, for the development of which we have displayed such astonishing facility.

It is only the youngsters in the profession who cannot recall when secondary stresses in structural members first became a matter of concern to the designer. The use of steel is only a little bit older, and the transition period from wrought iron to steel is well remembered by the more elderly active engineers. There are many engineers in active practice who can recall when pin joints were not computed by the methods in common use today. Yet in all the period of transition from wood in compression and wrought iron in tension, to wrought iron in compression and tension, to steel in compression and tension, there has been a uniform progress in development of raw structural materials, in improvement in methods of design, in standardization, in methods of fabrication and construction, in which progress there are no sharp lines of demarcation that denote radical departure or sudden change. And with it all, our progress in so short a time has been remarkable.

The civil engineer, in the static vein, warns the dynamically minded electric-welding engineer that welding of structural steel is not an exact equivalent of riveting. It does and will progress only as the differences cease to be obstacles. The civil engineer is jealous of his factors of safety, and therefore strength, reliability and permanence of joints loom large in his reactions to welding. Nor can he ignore the modifications in mill methods and design practices which are entailed if welding is to be given a chance to prove its economy.

—EDITORS.

Some fifteen years ago oxyacetylene welding had become a commercial feasibility, but electric welding was just struggling for a trial in America. The author had occasion to repair a machine with structural steel frame the base angles of which had split through at the roots. The conditions involved ruled thermit out and led to unsuccessful trials with oxyacetylene. A commerical welding firm improvised an arc-welding set and control for a weld that held until the frame was rebuilt.

The success in this trial led to the suggestion by the welding firm that electric arc welding be used for structural steel fabrication. It suggested a method of application wherein holes were to be punched in one of two members to be connected and to be left blank in the other. The idea was to build a rivet in place by arc welding. Nothing came of that proposal, because the war upset all plans. But the real impetus to welding was the demonstration program of the Emergency Fleet Corporation during the war.

Somewhat later electric welding was tried with moderate success in arc welding very thin tubes to the tube sheets in the heat interchargers of a chemical plant. The difficulty was that the tube spacing gave so little clearance between the tubes that the welder would draw an arc between the tubes and burn them off before he could make a weld between the tube sheet and the tubes.

These personal reminiscences are inserted just to show that welding has arrived where it has only after passing through a stage of trial and error, in which it discovered that it is seldom the exact equivalent of what it replaces and therefore has new obstacles to overcome. They suggest, too, that the development of electric arc welding has not been altogether plain sailing and that there are possible limitations to its use that cannot be successfully ignored. Welding as applied to structural design is still very much in the experimental and developmental stage. If one were privileged to look far enough into the future, he might be surprised to learn the ultimate relationship of electric arc welding to steel construction. What that ultimate relationship will be no one can foresee or predict.

Structural steel is the cheapest material now used in construction; that is, steel shows less relative increase in cost over pre-war prices than does any other building material. That this is true is due to the energy and ability of those who have to do with the production and fabrication of steel. During a 30-year period mounting costs have been matched with improved methods, and improved methods have kept pace so well with mounting costs that there is very little reflection of these higher costs in the finished product. And

the end of improvement is not yet. So welding has and will have a most difficult task to make its way into so highly competitive a field wherein existence has been won only at the cost of so much thought and energy expended in simplification and improvement. That welding will win a place in this field there is no doubt, but that such accomplishment will come only through orderly procession of progressive steps is equally certain.

As to the ultimate position of welding in structural engineering, assume the possibility that it may supplant riveting entirely. If it does, and when it does, welding will have shown more merit in this particular field than is yet apparent. Whether or not such merit is inherent is not in question. The point is that such merit has yet to be demonstrated. That it will have to be demonstrated is apparent when one contemplates the economic upheaval that will be brought about if it does supplant riveting.

The designer will be called upon to revise and revamp all his designing practices and specifications. The rolling mills will be called upon to discard many of the sections they now roll and to devise and substitute for the discarded ones new and unknown sections of yet-to-be-determined characteristics. The fabricator will face an even larger problem. His drafting room practice will have to be completely revised from the ordering of materials to the making of drawings. His fabricating shop practice will have to be revised from templets to shipping. His shop layout will have to be changed and his machinery discarded for new. His erection methods will have to be altered to handle a new kind of material. The designer, the mills, the fabricator, the erector, all will need to be shown before they will become overenthusiastic about welding.

What Is Economy?

Welding must demonstrate its economy over riveting. It has been pointed out that economy accrues in welded work through the elimination of "so many pounds of steel" in the connections; in other words, the welded structure is lighter than the riveted structure by "so many pounds of steel" and is more economical by the ratio represented in these saved pounds of steel. How much overworked is this false measure of economy! By the same hypothesis, why not eliminate all steel and save 100 per cent?

No one has ever tried to justify a pin-connected bridge over a riveted bridge because the pin-connected bridge was sure to contain less pounds of steel than the riveted structure. So, why apply such a measure of economy to a building? The true economy of welding over riveting will be demonstrated when it is shown that the cost of a welded steel building complete and ready for service is less than the cost of a like riveted structure, and when that advantage has not been gained at the expense of some other component building material or at the cost of greater time in construction.

Welding must demonstrate conclusively its reliability in building construction. To meet this requirement of reliability there must be provided means of inspection that are as certain and as rapid as are those which determine the reliability of riveted joints. This inspection requirement should present no real difficulties. One manufacturer has devised a method wherein the weld is made within an envelope of neutral gas, so that all oxygen is excluded from molten metal. When the manufacturer sees fit to make his apparatus available to every one it is quite probable that the human equation will have been so far removed from electric arc welding that surface inspection of welded joints will suffice.

Much effort has been expended in testing welded joints, and the results of these tests are excellent in so far as they go, but the designer will ask for many more tests and many more demonstrations before he can use welding with confidence. For instance, all tests have been made on welds of the "V" type, but it has not yet been clearly demonstrated whether other types are not just as practical.

It is almost certain that other types will prove to be desirable. All tests, excepting where the opposite has come incidentally through tests producing bending, have been made as tension tests, the compression factor being entirely ignored. Some attention should be given to the effect of compression. Then there is the question of cover plates. Past experience in riveted work has demonstrated that a certain definite intimacy must be maintained in connecting the component parts of built-up members in order that they may act together and as a whole.

Performance Not Fully Determined

All structural steel specifications contain the limitations that must be imposed upon riveted work to establish this intimacy, but the same limitations will not hold for welded work. The question is, will cover plates act properly if welded only on the extreme edges? What are the limits in width if edge-welding is used? Is it preferable instead to slot the plates and obtain some central welding, or to split the plates and move them apart for the same reason? Will the cover plates act better if they are pyramided; that is, each outer plate made successively narrower to provide a 90-deg. groove for welding? What will be the differentiation in requirements for column cover plates and girder cover plates? These are a few of the many questions that must be answered and the answers demonstrated before the designer may use welding without fear of error.

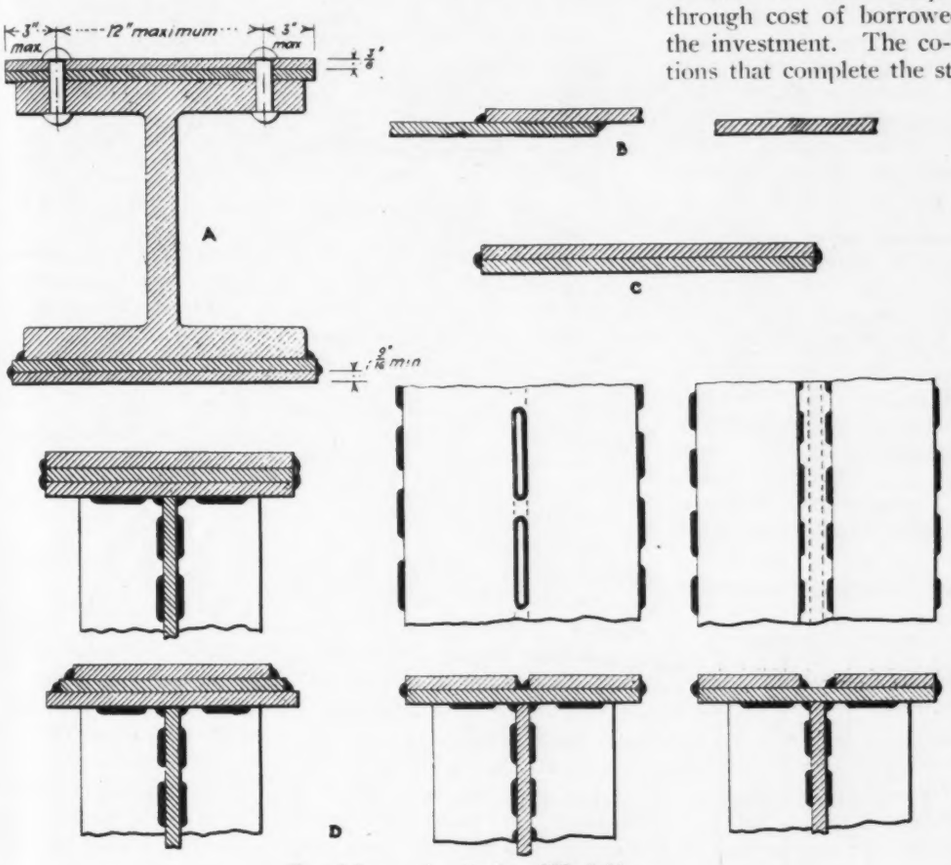
There is question of how much the rolling mills will be affected by the substitution of welding for riveting, but it is certain that they will be affected. The bugbear of the mill man is diversity of product. If he could set his mills to rolling one section and could continue them on that section for the remainder of his life he would live long and die happy. The low price of structural steel reflects great credit on this mill man. Blast furnaces have been made to double their production. Steel furnaces have been increased to enormous size. Mills have been made to roll tonnages that make the older mills look like toys.

Time Element Important in Mills

When one sets a flag flying from the mast of a mill building one may know that that particular mill has broken a record. These enormous units require the collecting of large orders in single sizes of material to keep the mills operating economically. It takes from two to six hours to change rolls in a large mill, and then more time for adjustments before the mill quits "cobbling." If the mill has only a few hours of productive rolling before rolls must again be changed, the material in this rolling will cost very much more than a similar quantity of material if the mill had rolled throughout the week without change of rolls. Mill expenses go on whether the mill is getting ready to roll or is rolling. The mills are not going to object to welding, but they "will have to be shown."

The fabricator, like the mills, has kept the price of his product down by improving his methods, by making machines do what men did before, and then by making the

machines do twice as much as they ever did before. Every non-productive move in the process of fabrication has been eradicated and every non-productive step has been eliminated. As much of the work as can be has been standardized and symbolized. It has taken much time and effort to perfect the system and to train the men to operate it. Welding will change this system from beginning to end. A new system will have to be devised and draftsmen trained to interpret it. Shopmen will have to be taught the new system and how to utilize it. New methods of assembly will have to be devised and men taught to follow them. New machines will have to be purchased and men taught to operate them. Any one familiar with structural steel fabricating shops knows that a beam shop is too short for fabricating any other material, that a girder shop is not suited for the production of mill building columns or trusses and that a bridge shop is too cumbersome a machine for the fabrication of light structural steel. Each type of shop layout is carefully thought out, and no other class of material can be passed through the same shop with economy. Competition is too keen to permit any one who tries the experiment not to feel the pinch. If electric welding displaces riveting in the fabricating process, the new shop layouts will be no more like the old than day is like night.



Problems in Joint Welding

(a) The upper flange shows minimum thickness of cover plate that may be applied to a rolled column of size shown (16 in.) and the rivet spacing required. Following the same specification requirement, the minimum thickness of plate for a welded flange would be as shown on lower flange, but there is no assurance that a welded flange will act the same under stress as does a riveted flange.

(b) Usual types of V-welded joints, which have been repeatedly tested.

(c) A type of welded joint that has not apparently been given a great deal of consideration.

(d) Examples of possible flange construction for welded plate girders, showing some applicable arrangements for welded construction.

In none of these arrangements, however, will the distribution of stress local to the component parts be similar to that prevailing in riveted girders.

The steel fabricator cannot step backward to a new beginning and work out the problems of the newer process by the same means that developed and perfected the old. He could not exist during the transition period. The fabricator will raise no objections to adopting electric arc welding, but he cannot introduce it by any other method than the evolutionary one that will enable him to prove each step and complete the transformation without losing his place in the procession.

The construction of tall office buildings has become a science. These buildings are costly structures and loss of time in their completion brings a double penalty through cost of borrowed funds and loss of return on the investment. The co-ordination of the varied operations that complete the structure is an intricate problem. Lack of co-ordination or stoppage of the uniform flow of materials or slowing of the progress of any operation may cause serious delay or entire stoppage of the work. The steel erector leads the procession of building operations. Upon him is dependent the speed of the following operations. They are always at his heels. If he is not able to place his two tiers of steel per week he will not long be an erector of steel. The steel erector will be more than pleased if welding will expedite his work, but his remarks will not be complimentary if it should retard his work.

The engineer who has the planning of projects can raise no objection to welding. He has no particular interest in its development other than its possible quality and economies. He has no particular prejudices, but will judge all materials and all processes by their peculiar fitness or lack of fitness to fill the particular needs he has in mind. From him there can be expected neither help nor hindrance. To him the matter is one for the sponsors of welding to demonstrate.

Fortunately for the future of electric arc welding in structural steel, the introduction was in the hands of the sponsors of welding. They were not hampered by knowledge of present-day structural steel practice, nor were they hindered by its prejudices or bound by its traditions. The results of their first efforts were excellent. Let them carry on. They may make mistakes, of course, but their mistakes will be both instructive and constructive mistakes, and their progress will be ever so much more rapid than if development were left entirely in the hands of the fabricator.

The work of the sponsors of welding is not yet completed and they should be brought to a knowledge of this fact. Let us hope that they will continue the work of development.

Load Characteristics of Farm Lines

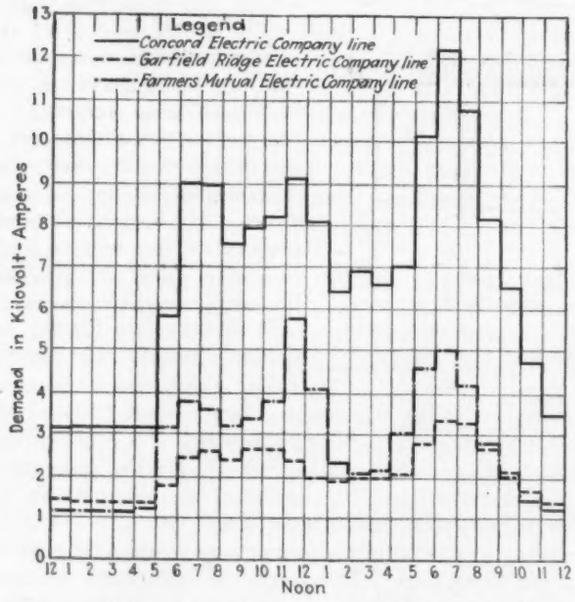
Power factor of higher voltage lines indicates desirability of this class. Classes of energy use tend to flatten out daily and seasonal load curves

By Franklin J. Zink
Assistant Agricultural Engineer
Iowa Project on Rural Electrification, Garner, Iowa

FOR A two-year period ended June, 1928, studies were made on the performances and characteristics of three farm lines running out of Garner, Iowa, serving, among other customers, ten co-operators in the Iowa Project on Rural Electrification. Some results of these studies were published in Electrical World of December 29, 1928. Some additional features of the investigation are presented here.

The equipment for gathering the data consisted of master meters at the substation for measuring power factor, watt-hours, volt-ampere hours and for graphically indicating kilowatt demand and kilovolt-ampere demand on a fifteen-minute interval basis. Meters were placed at each of the farms for integrating watt-hours and indicating kilowatts of demand for the same time period. The line master meters and the meters at each farm were read at monthly intervals and resettings made. Calculations then followed for reporting full information. The items of information were listed in the table here published.

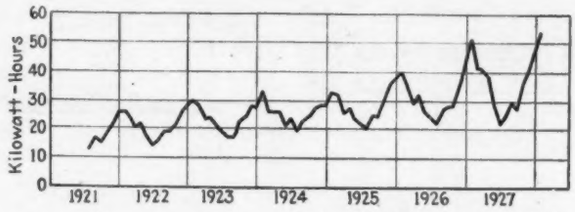
The findings on power factor of the lines seemed



Average Hourly Maximum Kilovolt-Ampere Demands of Three Rural Lines in Iowa

very unusual for the two 6,600-volt lines. At times on one of the 6,600-volt lines a leading power factor would be indicated. This seemed an impossibility and curiosity was considerably aroused as to the causes. The unusual results were also questioned by several engineers. To determine the accuracy of the recorded results a calibration test was made on each of the 6,600-volt lines. The test was made in the presence of several engineers and with instruments checked against those of the U. S. Bureau of Standards. The results of this test checked the original findings. Not satisfied with this check, the results were further substantiated by calculated theoretical results. The constants and losses of each individual transformer were obtained from the manufacturers. This information, together with the line constants, formed the basis for mathematical calculations of the theoretical power factors of each of the lines for an existing no-load condition.

The measured power factors of each of the lines are reported in the table. The calculated theoretical power



Average Energy Use of 50 Farmers for Whom No Effort Was Made to Develop Load

factors of the lines at a no-load condition were 34 per cent lagging, 92.2 per cent lagging and 97.3 per cent leading for the Garfield, Concord and Farmers lines respectively. The power factors of these lines would indicate the desirability of 6,600 or higher voltages when considered from this angle.

The accompanying chart of average hourly maximum kilovolt-ampere demand shows the variation of the load existing on these lines and the extent of the use of power. The maximum kilovolt-ampere demands recorded at fifteen-minute intervals on the charts of the line master meters were used as the basis for this chart. The maximum fifteen-minute kilovolt-ampere demand of each hour was tabulated for each hour of the day and these maximums were averaged for a period of one month. The monthly averages were in turn averaged to secure the average maximum kilovolt-ampere demands for each hour of the day for the period of one year. The chart then represents the average maximum daily load for the period of one year.

The three curves show that the load of the rural service line covers an eighteen-hour daily period. This period would doubtless be similar for most farming sections of the United States. The load coming on at 5 a.m. represents house and building lighting, some few household appliances, water pumps, cream separators and other chore time use of power. The major peak load of these lines occurred from 5 to 8 p.m. except for the Farmers line, where the peak is due to ranges and occurs at noon. The evening peaks are due primarily to lighting, with a considerable milking machine and cream separator load. Some range load, of course, also occurs in the evening.

The results show considerable variation of seasonal load on these lines. In general the summer season shows a considerable lower all-day energy consumption than the winter season. The fall and spring seasons compare very closely with each other. The spring season, with incubation and brooding load replacing the decreasing lighting load of the winter, has a strong tendency to keep this average energy consumption per farm up to nearly what it had been during the winter months. With the increased use of range equipment the average energy consumption of the summer may become the largest

Rural Line Characteristics

(Average for July, 1926, to June, 1927, inclusive)

	Garfield Line (One Co-operator) Average of Twelve	Concord Line (Six Co-operators) Monthly Results	Farmers Line (Three Co-operators)
Voltage of line	2,300	6,600	6,600
Miles, length of line	7.9	21.43	10.49
Number of customers	13–12	38	12.14
Kilovolt-ampere transformer capacity	16–14	111–113	34.5–40.5
*Average kilowatt-hour per customer	38	65	80
†Average kilowatt-hour per customer	30	38	31
Kilowatt-hour input to line	774	3,834	1,515
Kilowatt-hour output of line	494	2,465	1,084
‡Distribution efficiency, per cent	63.7	64.1	70.1
Average power factor, per cent	55.7	87.9	97.8
Kilovolt-ampere input to line	1,389	4,252	1,545
Connected load, kilowatts	26–28	185	85
Diversity factor	2.27	4.43	2.95
Demand factor, per cent	14.8	9.8	13.4
Load factor, per cent	26.3	30.2	13.3

*Includes co-operators. †Does not include co-operators. ‡Ratio of output of line to input and expressed as per cent.

of any season during the year. Lighting, large motors and radio equipment contribute to the winter demand.

There is a shifting of the morning and evening peak loads with the season of the year. The evening peak load for the fall season occurred between 5 and 6 p.m., while for the winter season this peak shifted to between 6 and 7 p.m. There is also a similar shift in the concentration of the morning load occurring between 5 and 7 a.m. during the spring and summer months and 6 and 8 a.m. during the fall and winter months.

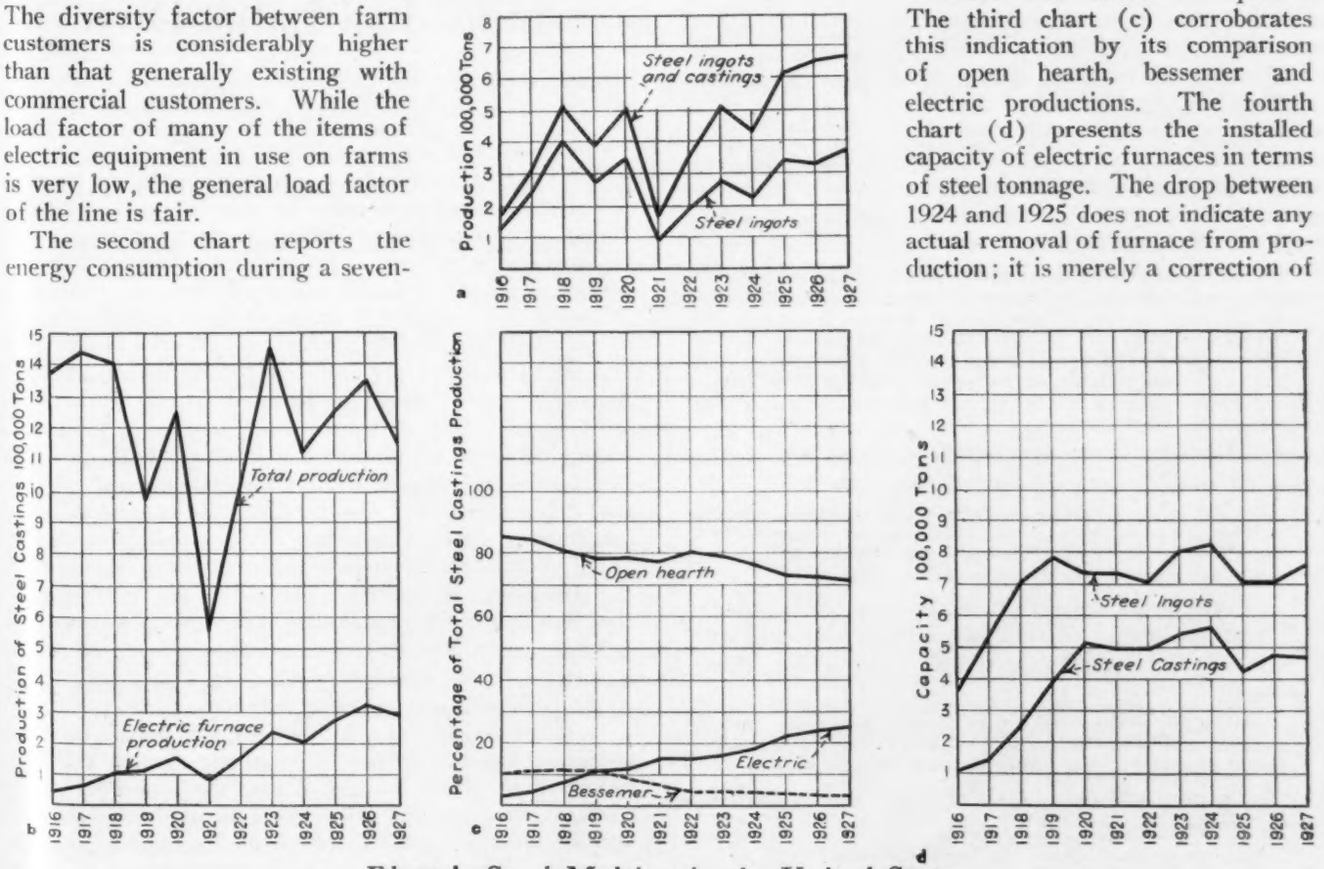
The demand, diversity and load factors each indicate the rural load as being desirable business when comparisons with these same factors in many classes of urban electric customers are considered. The demand factor of these lines is much lower than that of many other classes of electric customers. The diversity factor between farm customers is considerably higher than that generally existing with commercial customers. While the load factor of many of the items of electric equipment in use on farms is very low, the general load factor of the line is fair.

The second chart reports the energy consumption during a seven-year period for 50 farmers on the three lines. These farmers have not been given any help in developing their loads or in solving problems of the application of electric power. No sales efforts have been expended on them. The conclusion from this chart is that when no special attention is given to developing the rural load the average consumption of power per farm will remain low more or less indefinitely. A change of rate to one more applicable to rural service during 1925 had some effect in increasing the average energy consumption, but a desirable rate alone is not sufficient to build up a quantity consumption of electricity.

Electric Steel Melting Grows Apace

GROWING fast and lots of room to grow in. That is the condition of electric steel melting in the United States shown by the accompanying curves. Although the average increase of electric melting from 1916 is of the order of 5 to 6 per cent per year, which is gratifying, as yet only about one-quarter of the steel castings produced are melted in electric furnaces.

Inspection of the charts brings out some interesting points. The first chart (a) shows the production of steel ingots and castings by electric melting from 1916 to 1927. It is to be noted that the ground lost in the slump of 1921 was regained within two years and that the general tendency since 1923 is markedly upward. The same indication is given in the second chart (b), which shows that while there has been a decrease in the total output of steel castings the production from electric furnaces has continued upward. The third chart (c) corroborates this indication by its comparison of open hearth, bessemer and electric productions. The fourth chart (d) presents the installed capacity of electric furnaces in terms of steel tonnage. The drop between 1924 and 1925 does not indicate any actual removal of furnace from production; it is merely a correction of



Electric Steel Melting in the United States

Charts from Western Society of Engineers Hunt Award paper for 1929 by Delton T. Waby.

the curve by which a number of obsolete furnaces were dropped out of consideration. A comparison of the fourth and first charts shows that the actual production of electrically melted ingots and castings is about 50 per cent of the possible production. When one considers that the average utilization of productive machinery in general industry is stated to be about 30 per cent, it is apparent that the electric furnace is a better industrial performer than most. The spread between total production and electric production of steel castings indicates the field that still remains for the exploitation of the electric furnace.

Seventeen Essentials in Building Electrical Advertising

TO ASSIST power companies to cultivate the enormous potential load embodied in the electrical advertising field, the Society for Electrical Development, Inc., New York, has just published a Plan Book in which seventeen essentials of success in building this class of business are included. The potential revenue is $1.50 per capita, according to this pamphlet:

1. Designate a qualified specialist to head the company's electrical advertising activities.

This work requires special knowledge and the revenue justifies centralized direction of surveys and sales promotion.

2. Make a comprehensive survey of the market for electrical advertising.

Lists of prospects should be gathered in the field by trained men making direct contacts with customers in order that sales effort may be concentrated effectively.

3. Work out a concrete plan based on the local market survey.

A definite plan responsive to local conditions is a common denominator of the problem of selling electrical advertising.

4. Pave the way for salesmen by direct-mail letters and newspaper space.

Mail at least five pieces in regular order to prospects, inviting inquiries and adjusting the output to the facilities for promptly handling the business.

5. Make one or more short-term intensive campaigns part of the plan.

Continuous effort aids customer relations, but special campaigns are necessary to supplement these. Two weeks' work by 25 men on the Boston Edison system involving 9,500 letters and 3,000 calls yielded $24,260 in business to the sign manufacturers and $1,620 added revenue from energy sales per year. Manufacturers' co-operation added 9,000 blotters and letters, 30 men, $34,800 in sign sales and $2,698 in revenue to the power company.

6. Make the joint effort of the company and the local sign industry a basic feature of the plan.

Utilize the experience of the manufacturers. Definite planning of every move in publicity, calls on prospects, division of leads among manufacturers and complete understanding of every step in the campaign are essential.

7. Concentrate sales effort on the most likely prospects.

Classify survey cards and time publicity with field calls.

8. Make day-to-day activities productive through planning.

Follow up inquiries and prospects with promptness, making sketches and estimates speedily. Keep a close tie-in between power company men and manufacturers' representatives.

9. Proper selection, training and compensation of man-power.

Use advertising schools and manufacturers' facilities for training. Reward by salary-commission method and maintain quotas.

10. Provide each salesman with a portfolio showing local installations.

This adds "punch" to sales effort and arouses interest by proving reality of sales results.

11. Hold frequent meetings of all co-operating in this work.

Exchange of experience powerfully aids in sales effort.

12. Emphasize the place and value of indoor signs.

An immense field exists for marker signs in banks, department stores, office buildings, movie houses, hotels, etc. These signs burn from eight to twenty hours per day and average 2.5 lamps of 25- or 40-watt rating each. Over 600,000 are now in use.

13. Provide proper sign maintenance facilities.

Complete maintenance and inspection service is invaluable. Fix responsibility and prices for this work. Thirty per cent of sign revenue may be lost under inadequate maintenance.

14. Local sign ordinances should encourage business.

A suggested ordinance providing for adequate control by the municipality and aiding business growth may be procured from the society on request.

15. Use electrical advertising to sell electrical advertising.

Power companies should use electric signs freely.

16. Identify property with electric signs.

Faith in electrical display advertising is best shown thus. One syndicate erected 100 "coat-of-arms" signs in a year at a cost of over $170,000. Elaborate signs are needless and discourage popular following suit.

17. Hold an electric sign week or show yearly.

A sign week in March has become a national movement. This is backed by ample publicity and involves complete displays of the latest products, organized attendance, sales effort and emphasis upon maintenance.

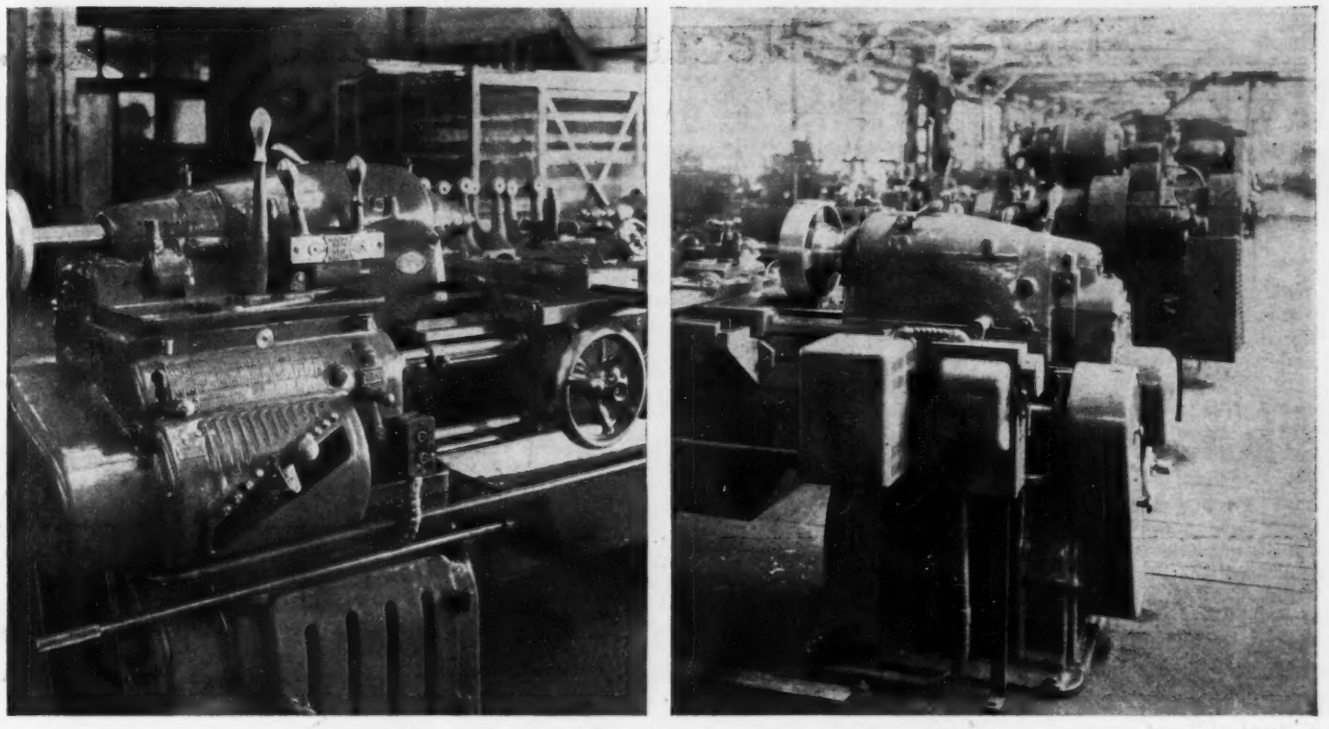
Magnetic Control Simplifies Individual Lathe Drive

By H. H. Watson
Industrial Control Engineering Department, General Electric Company

OF ALL machine shop operations probably the most fundamental operation is that of making things round. The machine tool which performs this operation is most often a lathe. In the accompanying illustrations are shown a front and back view of a Pratt & Whitney 16-in. model B lathe which is installed in one of the buildings in the Schenectady Works of the General Electric Company devoted to the manufacture of industrial control devices. Located on the front of the lathe immediately adjacent to the operating levers and occupying space which does not interfere with its operation is the push-button station for starting and stopping the driving motor. On the back is mounted a full magnetic starter using time-limit acceleration and a fused disconnecting switch. Mounted on the side of the disconnecting switch is an outlet for two plugs so that two drop lights are available for use on the machine.

In the ventilated inclosure which serves as one of the pedestals of the machine is located the 5-hp., 1,150-r.p.m., 230-volt shunt-wound motor.

It requires only a small amount of consideration to recognize the advantages of magnetic control and individual motor drive on such a machine tool as is shown in these illustrations. All space around the lathe except that occupied by the lathe itself is free and is available for use. The absence of belts and pulleys overhead allows traveling cranes to be used to the best advantage



Motor and Control Installation for a 16-In. Lathe

These front and rear views show the push-button start and stop near the operator's lever and on the rear is located a full magnetic starter using time-limit acceleration and a fused disconnecting switch.

for handling work. The absence of large drum switches or other manually operated devices for control gives more freedom to the operator. Further, in case of rearrangement of tools no line shafts need be considered, simply the electrical supply, which can be readily wired to any point.

Letters from Our Readers

Education Prevents Conflict of Authority in Accident Cases

To the Editor of the ELECTRICAL WORLD:

After reading the article in the ELECTRICAL WORLD of July 27 on the relative precedences of linemen, physicians and police in handling emergency cases, it occurred to me that you might be interested to know of our experience.

Without having made any extended investigation, we are doubtful if there are definite Massachusetts statutes outlining the relative prerogatives of physicians, police and public utility first-aid men in the handling of accidents. Our assumption is that if the injured person were not an employee of the utility, engaged on the company's business, the company's men would be subject to directions by physicians or police, but that if the injured person were an employee engaged on company business, the company's first-aid men would take precedence as agents of the employer because the employer would be responsible for the care of the employee.

Some time ago we came to the conclusion that the best way to avoid any friction would be through education of the other parties. This system has been followed by all of the twenty-odd companies under our management.

We let it be very generally known that our men are well qualified to perform first aid, especially artificial respiration, and that they would be glad to be called in any emergency. We also let it be known that we would be glad to give instruction to any one desiring it. The response has been most gratifying. In practically all the localities where we operate the first-aid men have given many talks and demonstrations on first aid and artificial respiration to police, firemen, doctors, nurses, boy scouts, clubs and other local organizations and, in many cases, classes have been formed and complete instruction given. In general charge of our first-aid instruction we have a qualified physician who is an expert and who has performed very valuable service in delivering lectures and giving demonstrations of artificial respiration to groups and organizations of physicians.

Our men are nearly always called in cases of asphyxiation and they are usually deferred to in the handling of such cases. They work in perfect harmony with physicians and police. Our districts are getting to be very well educated. Every one realizes that we want to help and that we know how and the local organizations appreciate the instruction we have given.

It is a long time since any opposition or friction has been encountered in handling a first-aid case and we do not anticipate any such difficulty, but I know that any one would have a job on his hands if he attempted to stop our fellows from working on one of their own gang.

Our activities in first-aid work not only have solved the problem of precedence but they have proved to be a mighty valuable agency for the promotion of cordial public relations.

I might mention that we have about 3,300 employees in our various organizations and that 60 per cent of them are qualified first aiders and the holders of Red Cross certificates.

R. P. PRIEST,
Assistant Supervisor of Safety.

C. H. Tenney & Company,
Boston, Mass.

Digest of Electrical Literature

Hydro-Electric Development and Steam Equipment

Boiler Steels at High Temperatures.—A number of investigations following a definite research program have been made in the past few years by the National Physical Laboratory to determine the behavior of materials at high temperatures. Particular attention has been directed to boiler and superheater tubes and to superheater and steam drums. A recently issued report contains observations upon tensile and creep tests made on 0.17 per cent carbon steel at temperatures up to about 650 deg. C. The main observations were made on bars of 0.17 per cent carbon steel normalized, although other steels were included. Test data and characteristic curves have been included.—*Engineering (England)*, August 2, 1929.

Generation, Control, Switching and Protection

Interlinked Swiss Stations. — H. EALES.—The most recent development in Swiss generating station practice has been the interconnection of two stations of two independent companies. Winter and summer variations in load and water supply available indicated the desirability of this practice. In order to accomplish the interconnection a regulating station capable of compensating for the variations of the voltage of the lines of one company and the lines of the other furnishes a junction between the two transmission lines, the objective being to adjust the voltage automatically by varying the excitation of the alternator at one plant, while at the other a synchronous auto-transformer installed in a substation close to the work takes care of the necessary operating procedure. In addition to the synchronous compensator there are two induction regulators, one of which is especially designed to limit the action of the synchronous compensator to the yield of the wattless current necessary on one line to the exclusion of that absorbed by the other. Full details of these lines and of the stations involved have been given. —*Electrical Review (England)*, June 14, 1929.

High-Voltage Air Circuit Breaker.—J. BIERMANNS.—While the physical problem of circuit breaker duty has been safely mastered, there still remains the potential danger from the necessary presence of considerable amounts of oil. The author has made a close theoretical study of the electrical and physical current rupturing problem. Breaking an arc in oil means pulling the electrodes far enough apart to extinguish the arc, which may require several cycles. An additional jet of oil and gases, such as is utilized in the explosion chamber type, will hasten this process somewhat. The author found that if means are employed to prevent reignition after the first passage of the current through its zero value the quickest possible break of the arc can be achieved. A powerful, externally generated jet of compressed air, blown between properly shaped electrodes, seems to accomplish this, as was proved by a large number of tests, with unfailing results. A dart-shaped moving contact, closing into a stationary circular nozzle contact, with the jet of air entering concentrically with the dart along its axis, was found to give the best results. Depending upon the desired rupturing duty, an air pressure of 80 to 220 lb. per square inch is required. A single-pole, single-break switch of this type was subjected to a series of tests, opening currents of 8,000 to 15,600 amp. at 9,000 to 17,000 volts, representing a rupturing energy of up to 265,000 kva., opening every time within half a cycle, and with a surprisingly small wear on the contacts. A similar three-phase breaker opened safely 500,000 kva. also within half a cycle. The breakers are compressed air operated.—*Elektrotechnische Zeitschrift*, July 25 and August 1, 1929.

Motors and Control

Synchronizing Forces in a Motor-Converter.—T. S. ANDREW.—Stability in any synchronous machine is inherently dependent upon its synchronous forces. The present discussion represents an endeavor to evaluate the elements involved in a purely physical and non-mathematical way for the machine as a unit; the alternating-current end; the direct-current end, and for the machine in synchronism, tending to increase in speed from synchronism, and tending to fall in speed. Vectorial relationships have been used.—*Electrical Review (England)*, August 9, 1929.

Illumination

Glare and Visibility in Artificially Lighted Streets.—W. S. STILES.—As the result of an experimental investigation with a number of street-lighting installations specially erected for a conference of lighting engineers a number of measurements of eye sensitivity were made through the use of a special set of contrast disks. It was determined that the eye sensitivity depends on the direction in which the observer looks and varies with the number of lamps in the field of view, the candlepowers, the mounting height and distance away. The most important direction of view in practice is that for an observer in the middle of the roadway, and the eye sensitivity measurements made for this direction of view show a good correlation with those computed formulas established in laboratory investigations. Methods of appraisal depending on personal opinion were also employed in this work. The discussion gives observational data, conclusions and recommendations. The evidence as a whole suggests that in estimating glare the observer depends for his judgment on the general sensation of discomfort produced by the most glaring source in the field, but that the depression of eye sensitivity and the discomfort effect due to a given lamp rise and fall together.—*Illuminating Engineer (England)*, August, 1929.

Transmission, Substations and Distribution

Limits of the Economical Transmission of Electrical Energy.—E. W. MARCHANT.—An analysis of the elements entering into the determination of the cost of delivering energy to the consumer, including data for generation and estimated and actual costs for transmission lines. The effect of fuel consumption upon relative economy of carrying coal and conveying energy electrically has been considered, as has the economic limit for length of haul for coal. The influence of the load factor on the system has likewise been subjected to a critical examination and the whole discussion has been approached from the economic viewpoint upon the basis of securing the best results at the minimum cost. Quarter-wave transmission and its possibilities in long-distance transmission are among the topics that have been treated.—*Engineering (England)*, August 9, 1929.

Corrosion of Lead Cable Sheathing.—H. A. TUNSTALL.—A review of the available information regarding the corrosion of lead cable sheath has been offered in this discussion and the influence of various alloys and surrounding materials has been evaluated. The author concludes that the straightforward serious chemical corrosion is retarded, but not prevented, by the use of lead alloys which are available for cable sheathing, but that where, for the sake of appearance, it is necessary to guard against slight superficial corrosion or tarnishing, as in house-wiring cables, the use of lead alloys is an asset. The influence of acids and alkali has been given particular consideration.—*Distribution of Electricity (England)*, July, 1929.

Mechanical Fatiguing of Overhead Cables.—K. BECHTOLD.—Hollow cables of large diameter, such as are used on some high-voltage transmission lines, are not only statistically stressed by their weight between towers but are also subjected to considerable additional stresses due to transverse motion, caused by more or less severe swinging in the

wind. A mathematical approach to this subject is presented, assuming certain wind velocities and span distances. An attempt was made to check the results by laboratory tests, in which a length of cable was artificially subjected to transverse motions of adjustable amplitude. With the limited span thus available, proportionately smaller amplitudes had to be chosen, for which reason the author does not believe implicitly in the truthfulness of these artificial and accelerated tests. He does believe, however, that the number of successfully withstood bends of a definite magnitude are useful as a basis for determining the ultimate fatiguing strength of a given cable.—*Elektrotechnik und Maschinenbau*, July 14, 1929.

Heat Applications and Material Handling

Electromagnetic Hammers. — P. SCHIEMANN.—Classifying electric hammers according to their duty, from the smallest engraver's hammer to the large forging hammer, the author establishes twelve main types. A large number of designs for all of these classes has been developed in the last 40 years in an endeavor to compete with the compressed air hammer, some of them motor driven, others of the magnetic type. The motor-driven models did not survive, while some of the latest magnetic designs seem to be gaining ground for lighter duty. The article deals, therefore, only with the latter types, of which are given descriptions of several European and one American design. At present only alternating-current operated hammers with and without a rectifier are in use. Electrolytic and tube rectifiers are being used commonly, but the author has great hopes that the new dry type of rectifier (copper oxide) will help greatly the further popularization of the electromagnetic hammer. Direct-current hammers did not survive, it is stated, because they need either an interrupter or a special, motor-driven, current chopper, the former lacking reliability, the latter being too complex for the rough service to which such hammers are usually subjected. — *Elektrotechnische Zeitschrift*, July 18, 1929.

Electrophysics, Electrochemistry and Batteries

Electrolysis of Water Under Compression. — A SALMONY — A historical and analytical discussion of several methods of producing oxygen and hydrogen by electrolysis, with particular reference to high-pressure electrolyzers and the performance which may be anticipated by their use. Characteristic curves and outline diagrams indicate the elements involved. It is stated that advances in water electrolysis have led to a great expansion in the economic use of hydrogen and oxygen for various industrial purposes and that in the chemical industry reduction and oxidation can now be carried out, employing the gases directly instead of through previously used chemical methods. The use of high-compression electrolyzers, combined with a superheater and storage system for oxygen and hydrogen, permits the boiler plant arrangements to be relieved of considerable duty and the saving corresponding to the superheating power sometimes ranges as high as 18 per cent.—*Electrical Review (England)*, August 9, 1929.

Telegraphy, Telephony, Radio and Signals

Long-Distance Telephone Cables.—A. ENGELHARDT and H. COBDEN TURNER.—Continental practices in regard to the use of cables for telephone work over comparatively long distances have been analyzed by the authors. A number of conclusions as to the kind of cable that should be used for various working purposes and statistics regarding the use in various countries have been included. The authors have also considered the problem of attenuation, phase equalization and phase propagation.—*Electrical Review (England)*, August 9, 1929.

Traction

Electric Railway Equipment.—Fifty years ago Werner Siemens demonstrated, on May 31, a small electrically propelled train on the grounds of the Berlin industrial exposition, transporting on it, subsequently, over 80,000 passengers along a track of about ½ mile. Starting from this nucleus, modern electric traction took its starting point, beginning with the trolley car and culminating in main road electrification. The developments during this half century are made the subject of a symposium. Among the outstanding articles may be mentioned the use of rotary condensers for single-phase traction service, the supply of the Berlin electric rapid transit system, train dispatching, floodlighting of railway yards, asynchronous rotary condensers, and the performance of rotary converters in parallel with storage batteries.—*Siemens Zeitschrift*, May, June, 1929.

Japanese Express Locomotive.—S. HANZAWA—The increased traffic on the electrified lines of Japan made it necessary to provide ten new express engines, all of which were designed and built by Japanese factories. The new machines are provided with one motor for every driven axle, or a total of six motors of 305 hp. each, driving over 1:3.45 gear reduction. The locomotives are built to accommodate the Japanese narrow track gage of 42 in., and can develop a maximum speed of 56 m.p.h. Direct current of 1,500 volts is supplied through overhead structure through a double pantograph. Speed regulation is obtained by a series-group-parallel arrangement of the six motors through a set of compressed air-actuated contactors. Illumination and heating are derived from a 2-kw. motor-generator set, 1,500/100 volts, in conjunction with a storage battery. The engine weighs complete 106 tons and has pulled successfully 700-ton trains between Tokio and Odawara. — *Elektrotecknik und Maschinenbau*, June 23, 1929.

Railway Electrification in Czechoslovakia.—J. BILEK.—Aside from a few short secondary lines, the railway electrification program of the young Czechoslovakian republic, formerly the northern part of the Austro-Hungarian monarchy, has only just begun. Only the immediate approaches to one of the stations of the capital, Prague, the Francis Joseph station (now Wilson station), has been equipped with electric traction with the direct-current 1,500-volt system, accepted as the national system for all future roads. In a southerly direction a ¾-mile tunnel under the suburb Weinberge follows immediately after the station and called for a special humidity-resisting overhead structure. Although there are only 40 miles of electrified tracks, several Czechoslovakian concerns shared in the supply of equipment and rolling stock.—*Elektrotechnik und Maschinenbau*, June 9 and 16, 1929.

Miscellaneous

Electric Supply of Holland.—W. LULOFS.—Of the 7.4 million mainland inhabitants, 96.5 per cent are supplied with electric light and power. Due to a reasonable current rate and a free-of-charge wiring of houses, oil and gas illumination is today practically unknown in Holland. Since 1927 the main railway line from Amsterdam to Rotterdam and a branch line to Ymuiden are electrified with 1,500 volts direct current, derived from a rectification of the existing three-phase, 50-kv. national network. Electric heating is used extensively, particularly hot water storage with inexpensive night current.—*Elektrotechnische Zeitschrift*, June 13, 1929.

Physiological Response Attending Exposure to Vapors of Methyl Bromide, Methyl Chloride, Ethyl Bromide and Ethyl Chloride.—A study has been made of the comparative toxic effect upon certain animals of air containing vapors of methyl bromide, methyl chloride, ethyl bromide and ethyl chloride. The conditions of exposure as regards concentrations of vapor and time ranged from those causing no serious response to serious response after a period of a few minutes to several hours' exposure. The results of the experiment are given in detail in tables and a summary of findings as regards concentrations which produced various degrees of response are given in curves and tables. These findings are also compared with those of other common gases and vapors. One of the conclusions derived is that methyl bromide and methyl chloride and possibly ethyl bromide and ethyl chloride do not possess sufficient warning properties to prevent serious voluntary exposure.—*Public Health Bulletin No. 185, United States Public Health Service.*

News of the Industry

Commissioners Assemble at Glacier Park

Montana Meeting of National Association Takes Up Question of Federal Regulation of Interstate Utilities and State Bodies' Proper Attitude

GLACIER NATIONAL PARK, in northwestern Montana, is the meeting place this week of the National Association of Railroad and Utilities Commissioners, which assembled on Tuesday and was to continue in session up to and including Friday. About 40 state utility-regulating bodies were expected to be represented, and more than 240 reservations were reported.

Chief in general interest among the subjects to be discussed is that of the proposed enlargement of federal regulation to include interstate utility business and the relations that should subsist between state and national regulation. This discussion will be reported in the ELECTRICAL WORLD next week.

Among prominent speakers at the convention were to be Lewis E. Gettle, president of the association and chairman of the Wisconsin Railroad Commission; Governors J. E. Erickson of Montana and Clyde H. Reed of Kansas, Chairman E. I. Lewis of the Interstate Commerce Commission, Representative Scott Leavitt of Montana, Carl D. jackson, M. H. Aylesworth, Paul S. Clapp, William S. Leffler and General John F. O'Ryan of New York; William E. Hagenah of Chicago; Ralph Budd, president Great Northern Railway; E. S. Wilson, vice-president American Telephone & Telegraph Company; J. P. Barnes of the American Gas Association and Marcus A. Wolff of Newark, N. J.

Kansas City Power & Light Files New Rates

The contemplated appraisal of the property of the Kansas City Power & Light Company by the Missouri Public Service Commission with the object of bringing a reduction in rates (ELECTRICAL WORLD, August 24, page 398) has been deferred for at least eighteen months, and the company has filed a voluntary reduction of its residential and commercial lighting rates which it is estimated will save $360,000 per annum to its customers in Kansas City and vicinity. An appraisal, it is estimated, would have cost the company about $250,000, which ultimately the consumers would have had to pay.

A majority of the commissioners have informally approved the new schedule, which, if it obtains formal acceptance, will become effective on November 1. The reductions in residential rates for five counted rooms are: For 5 kw.-hr. a room a month from 7 cents to 6½ cents a kilowatt-hour; for next 5 kw.-hr., from 5 cents to 4½ cents. The excess over 10 kw.-hr. remains at 2½ cents. Reductions are also listed for commercial and small power users and for rural customers.

Companies in Mid-South Form Industrial Bureau

Expansion of existing industries, establishment of additional factories and the further development generally of the industrial, agricultural and mineral resources of the Mid-South—Arkansas, Louisiana, Mississippi and west Tennessee—is the purpose of the Southern Industrial Engineering Bureau, established by the Arkansas Power & Light, Louisiana Power & Light, Memphis Power & Light, Mississippi Power & Light, New Orleans Public Service and West Tennessee Power & Light companies, according to announcement issued recently from the offices of Harvey C. Couch, president of the Arkansas, Louisiana and Mississippi Power & Light companies.

The bureau will be in charge of C. L. Shelby, until recently industrial agent of the Illinois Central Railroad, who has had wide experience in work of this kind. Its activities will be directed by a board composed of officials of the power companies co-operating in the enterprise.

The facilities of the bureau are to be available to all communities in the section of the South covered by the power companies, the plan being to serve as the agency by which the opportunity and opportunity seeker may be brought together. It is not intended to duplicate the work of the local chambers of commerce, Mr. Couch explained, but to augment and aid it through engineering and industrial studies of the territory, which he holds offers opportunities greater than those of any other section of similar area.

Brooklyn Edison Will Add a 110,000-Kw. Unit

Still another great generating unit—the sixth—is to be added to the Hudson Avenue plant of the Brooklyn Edison Company, President M. S. Sloan announces. This will be a Westing house cross-compound 110,000-kw. steam-electric turbo-generator with auxiliary equipment. It will cost $7,000,000 and will probably go into operation in the spring of 1931. Four boilers to supply steam for this turbine equipped with automatic stokers have been purchased from the Babcock & Wilcox Company and will be ready for operation in the fall of 1930.

The new unit will be similar in its main features and capacity to the fifth unit in the same station, which was placed in operation in September, 1928. After its installation the capacity of the Hudson Avenue generating station will be 450,000 kw. and that of the metropolitan system under Mr. Sloan's presidency close to 2,000,000 kw. Eventually Hudson Avenue will have eight generating units, with a total capacity in excess of 750,000 kw.

Seattle's Five-Year Plan

All Overhead Wiring in Business District to Go Underground and Electric Service to Be Extended at Total Cost of $10,000,000

AN OUTLINE of the plan for a five-year ten-million-dollar development program for the municipal light department of Seattle has been made public by Councilman Philip Tindall, chairman of the public utilities committee. The program calls for replacement of all overhead wiring with underground conduit systems throughout the entire business district, the extension of production facilities in virtually all substations within the city limits, and the reimbursement of the light department to the extent of about $2,000,000 loaned out of its earnings for betterments and extensions already completed.

The program also includes the expenditure of at least $1,000,000 a year for five years to extend the department's power and light service in various districts for the accommodation of increasing numbers of customers. The first step in the five-year program is an ordinance to provide $500,000 for immediate work. Further appropriations will probably be asked in ordinances to be introduced as soon as the Council decides on a policy to be followed in connection with the construction of a new downtown city light substation at Third Avenue and Madison Street.

Two proposals are now before the Council in respect to this structure. Under the one it is proposed that the city light department erect its own building on the site, which is already owned by the city, at an estimated expense of $500,000, while under the other is being considered an offer by private interests to erect a tower-type substation and office structure in which the city is to rent substation and office space, with the understanding that the building will become city property at the end of 35 years.

Betterments and extensions contemplated in the ordinances introduced in

Council include improvements at six substations and extensions of present underground wiring between the Denny Hill regrade and Jackson Street, along First, Second, Third and Fourth Avenues. It is estimated that the cost of this work, which is to begin immediately, will be nearly $500,000. Of this amount, $172,220 is already on hand in funds previously authorized by Council for such purposes. Under Mr. Tindall's plan, an additional $316,000 in new money would be voted as a loan to the capital investment account of the department from the light fund surplus.

An additional feature of the general plan is the underground wiring of the Denny Hill regrade district before new paving is put in. Superintendent J. D. Ross and other officials of the light department have been working on the details of the general plan.

Western Inspectors' Topics Plentiful

They Include Special 15-Amp. Fuse, Contractors' License Ordinance, Sub-standard Flexible Cord, Wiring Costs, Small Breakers and Bare Grounded Neutral

FOUR hundred delegates registered at Detroit this week for the "silver jubilee" convention of the Western Section of the International Association of Electrical Inspectors, held Monday to Wednesday inclusive.

A resolution was adopted urging the electrical committee of the National Fire Protection Association to press for the adoption of a special 15-amp. fuse plug for use in protecting branch lighting circuits.

H. B. Kirkland of the Society for Electrical Development, urging the general adoption of the National Electrical Code with special provisions for local requirements, said: "No other code-making body can hope to equal the electrical committee in breadth of knowledge and experience or in the resources at its disposal for obtaining expert opinions." Mr. Kirkland, who is in charge of the preparation of uniform ordinances for the S. E. D., promised soon to release a contractors' license ordinance that would be legal, replacing ordinances of doubtful legality now existing.

Adverting to a new underwriters' standard, prepared in conjunction with the electrical industry, and a pamphlet issued to simplify the detection of sub-standard flexible cord in the field, J. C. Forsyth, New York, said that flexible cords produced more fires than any one other thing except carelessly used flat-irons. Arthur P. Good, Chicago, told of co-operation by the Commonwealth Edison Company in protecting customers from sub-standard cords. He said that the flexible-cord hazard in Chicago was negligible.

Miss Sarah M. Sheridan, vice-president Detroit Edison Company, addressed the convention, stressing the necessity of lowering the cost of wiring homes, not by scanty wiring, but from the manufacturing standpoint.

Inspectors in future must in some way protect the public against "cheap-skate" contractors, Fred B. Adams, St. Louis, declared. He said that a certificate of inspection now only protects against fire hazard, no regard being given to the specifications of the architect.

H. J. Mauger, chairman of the Heating Device Section of the N.E.M.A., told of the campaign against sub-standard cords and plugs and the endeavor to educate price-cutting department stores and other sellers.

Arthur L. Abbott, New York, proposed a yardstick to determine the adequacy of wiring in homes on the basis of watts per square foot. From 0.5 watt to 1.5 watts should prevail in the average home, he said.

Considerable progress was reported in the matter of inspecting and labeling electric cars. Illinois Central cars are all inspected and labeled as manufactured now, and the practice is growing.

Small-capacity circuit breakers for use as meter-service entrance breakers in place of fuses were exhibited by H. G. Nichols, Westinghouse Electric & Manufacturing Company. Much interest was aroused by the new electric range being manufactured by the Detroit Edison Company, which was on exhibition.

Conflicting opinions developed concerning the bare grounded neutral. A. H. Meier, Evansville, Ind., claimed increased safety and economy for it, while Dr. M. G. Lloyd, United States Bureau of Standards, said that such neutrals in metal conduits were undesirable because of their liability to carry stray currents all over a building.

James W. Bishop, a special representative of Henry Ford, described plans under way for celebrating "Light's Golden Jubilee."

Applications for new chapters were accepted from Kentucky and Ohio. Officers elected for the coming year are: President, L. A. Barley, Denver; first vice-president, Arthur G. Hall, Toronto; second vice-president, R. L. Daniel, Minneapolis; chairman executive committee, L. L. Johnson, Chicago. William S. Boyd was re-elected secretary.

First Unit of New Gorgas Plant Ready

Tests of the first 60,000-kw. generating unit of the Alabama Power Company's new Gorgas steam-electric plant were recently begun. This plant, designed for an ultimate rating of 240,000 kw., is built on the Warrior River about 24 miles northwest of Birmingham and just across Baker's Creek from the older Gorgas plant, which has two 20,000-kw. units and one 30,000-kw. unit. The two plants will be operated as one, and their combined rating of 130,000 kw. will outrank that of any single steam plant in the South.

The new 60,000-kw. unit is said to be the largest south of Philadelphia. Energy is generated at 13,800 volts and is stepped up for transmission at 44,000 and 110,000 volts through 70,000-kva. transformers. It is furnished with steam from two 30,000-sq.ft. boilers equipped with water-cooled furnace walls, air heaters and fans and designed to burn pulverized fuel fed to the boiler by the bin system.

The unit was manufactured by the General Electric Company and has a capacity of 60,000 kw. at 90 per cent power factor. Its construction will permit carrying 66,700 kw. by merely reducing the amount of steam bled for feed-water heating. The turbine uses steam at 400 lb. gage pressure and 750 deg. F. total temperature.

The new 110-kv. transmission line from Gorgas to West Point, Ga., went into service on July 28.

Senator Norris Castigates "Power Trust"

Speaking at the unveiling of a statue to Lincoln at Freeport, Ill., on August 27, Senator Norris of Nebraska again found an opportunity to denounce the "power trust," basing his accusations on the Federal Trade Commission's investigation of utility companies. Calling the alleged trust the "greatest monopoly ever put together by human ingenuity," the Senator accused it, among other things, of having "invaded the public schools," "contaminated the colleges," "controlled the legislatures," "attempted to buy seats in the United States Senate," "approached the minister in his pulpit," "browbeaten, purchased and contaminated the public press," "controlled secret, economic, political and religious societies" and "spent millions of money" to further its plans. All these things were done, the orator said, by "underhand, dishonorable and unpatriotic methods."

Asserting that the trust has as its ultimate aim "complete ownership and distribution of electric power," Senator Norris went on to declare:

> If this necessity of human life is to be owned and controlled by monopoly, then the people will ultimately become the economic slaves of the owners of this modern necessity. In the main it is developed from our natural resources.
>
> This great necessity of our existence, a part of the very sinews of our life and our civilization, must be taken to the factories and to the homes of our people without being loaded down with monopolistic costs and profits. It is rapidly becoming a part of our civilization and the will of an all-wise Creator in giving this blessing to mankind must not be perverted and used by private monopoly for private gain—for the subjugation and overburdening of the people.

Purchases and Mergers

Virginia Cities Reluctant to Sell Municipal Plants—Insulls Buy Potomac Sites—San Domingo Disposes of Plants to Americans

FREEHOLDERS of Radford have again refused, by a majority of 185 in a vote of 435, to dispose of its electric light and power franchise for $400,500, offered by the Republic Service Corporation of Coatesville, Pa. Three years ago the freeholders refused to sell to the Appalachian Electric Power Company for $275,000. Since the municipal dam washed out several years ago the city has been buying power from the Appalachian company at wholesale and distributing it.

The Town Council of Martinsville has declined an offer made by the Appalachian Electric Power Company to buy the city-owned electric plant for $850,000 cash. Negotiations are not at an end, since the Council appointed a committee to continue conversations.

The Danville (Va.) city power commission, appointed nearly three months ago to weigh the sale of the city-owned gas and electric properties, has been called to meet to hear from its subcommittee, which will recommend that bids be taken for either or both of the municipal plants and that, if a sale is made, the money be used to retire the city's bonded indebtedness, aggregating $3,000,000. The People's Light & Power Company of New York is said to be a would-be bidder.

Sale of the water rights owned in the Potomac and Shenandoah Rivers by the Harper's Ferry Paper Company to the Insull interests of Chicago for $1,100,000 gross is announced through W. H. Savery, president of the selling company.

Upstate New York newspapers report that the St. Lawrence County Utilities of Potsdam is to be merged with the Niagara-Hudson Power Corporation. The Potsdam utility purchases energy from the allied St. Lawrence Valley Power Corporation, which has six hydro-electric plants totaling about 60,000 hp. It serves Canton, Gouverneur, Massena, Ogdensburg, Potsdam and other places.

A petition for the approval of the sale of the franchise of the Sevierville Light & Power Company to the Tennessee Public Service Company has been filed with the Railroad and Public Utilities Commission.

City authorities of Shelbyville, Ill., are expected to act soon upon seven bids which have been received for sale of the municipal electric light, power and water plants to private owners. The Central Illinois Public Service Company, Springfield, which has been supplying power to the electrical distribution system since the municipal plant became impaired, bid $350,000 for the plants with concessions and promise of a 10 per cent reduction in the light tariff. H. C. Higgins and Edgar Foster of Centralia submitted the high bid of $378,000, but with such conditions that the Central Illinois bid is more likely to be accepted.

A petition from the Interstate Public Service Company of Indianapolis has been filed with the Indiana Public Service Commission for leave to purchase nine small power distribution systems near Bremen, Marshall County. The companies all purchase energy from the town of Bremen, which, in turn, purchases from the Interstate company.

A petition has been filed with the Indiana Public Service Commission by the Rural Light & Power Company, operating in Decatur County, Ind., for authority to sell its equipment to the Southeastern Indiana Power Company.

An offer of the Midland Utilities Investment Company to purchase for 20 per cent of their face value the underlying bonds of the Union Traction Company of Indiana, which controls the Traction, Light & Power Company of Anderson, Ind., is a bona fide one, to be accepted or rejected by the bondholders on a basis of service to patrons of the utility, according to Samuel Insull, Jr., president of the Midland company. This assertion was contained in a formal statement replying to minority bondholders who have taken steps to oppose the Insull offer. The traction company, whose subsidiary supplies light and power to about sixteen small communities, has been in receivers' hands for about five years.

The Hastings (Neb.) municipal power plant will take over the transmission lines and distribution system which serve the village of Juanita with energy purchased from Hastings.

W. W. Briggs, vice-president and general manager of the Grays Harbor Railway & Light Company, Aberdeen, Wash., has informed the Mayor of that city that his company has no wish to sell all or any part of its electric light plant here. The letter was in reply to one from the Mayor asking if, and at what figure, the company would sell its distribution system. The Council has for some time had condemnation proceedings under consideration.

Petition has been made to the New York Public Service Commission by the Lockport Light, Heat & Power Company for consent to the transfer of its property to the New York State Electric Corporation. The Lockport company distributes electricity and gas in Lockport and vicinity.

A new company known as the Beauharnois Power Corporation is being formed in Quebec Province to own all the securities of a group of Beauharnois subsidiaries, including the Beauharnois Light, Heat & Power Company.

The Southern Cities Utilities Company has acquired from the Dominican Republic the electric and water properties which the special American commission headed by former Vice-President Dawes advised the republic to sell on the ground that it would improve the finances of the Dominican government. The Compañia Electrica de Santo Domingo, the Dominican subsidiary of the Southern Cities Utilities system, has completed arrangements to buy and operate the electric system in Puerto Plata, the principal northern seaport, and the electric and water systems in Santiago, the second largest city of the republic. The Dominican company acquired recently the electric system in La Vega and previously owned the Santo Domingo and San Pedro de Macoris electric systems.

Federal Agencies on Safety of Electric Refrigeration

A joint statement was issued at Washington on August 22 by the Public Health Service, the Bureau of Standards and the Bureau of Mines with the purpose of relieving "any undue anxiety in the mind of those possessing household refrigerating systems. Several deaths," the statement said, "which have occurred recently in Chicago have been attributed to poisoning by methyl chloride which leaked from refrigerating systems. These have received wide publicity, even among the users of refrigerating equipment entirely unlike that to which the fatalities have been attributed.

Serious accidents from household refrigerating systems, the statement continued, have been small in comparison to the number in use, and it added that improvements might be expected which would reduce materially the small hazard which does exist.

Gas ammonia, sulphur dioxide and methyl chloride were reported to be the three most important gases used in mechanical refrigeration. Of the three, the report said, methyl chloride was the least poisonous, but because of its "slight and rather pleasant" odor, which might not awaken a sleeping person and might not be recognized by one who was awake, it probably contained a greater hazard than any other commonly used refrigerant. The other two mentioned were said to have strong odors easily recognized.

Studies are now under way for eliminating the danger from methyl chloride, and the report said that safety probably would be accomplished by adding some strong odor or by substituting another refrigerant.

N.E.M.A. Strives to Perfect Refrigeration Safety

Leland P. Bannister, merchandising adviser for the Refrigeration Division of the National Electrical Manufacturers' Association, has issued a statement concerning the refrigeration safety code which the division started to prepare in May for review by the American Standards Association and to the formulation of which the accidents in Chicago in July lent impetus.

From a purely constructive point of view, Mr. Bannister says, the Chicago situation showed the industry that what it had honestly considered safeguards up to that time were not adequate. The art had to be developed to a higher point. A thorough investigation showed the problem was one of how the refrigerant was to be contained and controlled rather than the elimination of certain refrigerant gases.

Since all the Chicago accidents occurred in dwellings and apartments containing multiple installations, the first arguments centered around the banning of multiple systems. It was finally stated that the industry can and will make multiple installations safe. The questions still remain, however, of the number of apartments that should be connected to one machine and the number of pounds of refrigerant to be allowed in any single system.

Dr. Arnold H. Kegel, health commissioner of Chicago, placed the burden of proof on the industry by stating that no installation was safe which permitted a possible leakage of 2 lb. or more of refrigerant into the residential part of any dwelling in twelve hours, or of 10

in. or more into the basement. The manufacturers' test specifications in that connection are of interest. Most manufacturers have succeeded in producing refrigerators in which the leakage is limited to less than 2 per cent of the total refrigerant content in a year's time. This would seem to prove definitely that the few accidents that have occurred have been due to faulty installations and improper treatment of refrigerators in use.

At the present time hearings are still being continued in Chicago. The next meeting between the industry and the Chicago officials will be held prior to September 11. In the meantime the industry, represented largely by the N.E.M.A. Refrigeration Division, is making every effort to complete a safety code in form for submittal to the A.S.A.

Federal Trade Commission's Utility Investigation

In its monthly report the Federal Trade Commission interprets the decision of Judge Knox in the Electric Bond & Share case as holding "that to this time no sufficient showing has been made to entitle the commission to have produced the books which were subpœnaed."

With regard to its investigation of utility companies the commission says: "Accountants from the commission continued their analysis of accounts in Chicago, Oklahoma City and Salt Lake City. Retruns from the financial and statistical report schedule continued to be received during the month. One branch of the inquiry, which is making a study of the relations between utility groups and service organizations, continued its field work on the operating and sub-holding companies in the States of Colorado and Washington. Other work was done along this line in New York, Chicago and several cities in South Carolina."

Oklahoma City to Have a New Generating Station

Plans for the construction of a 30,000-kw. steam-electric generating station for the Oklahoma Gas & Electric Company at Belle Isle Lake in Oklahoma City have been announced by Vice-President J. F. Owens. The plant will be built on the north shore of the lake immediately west of a 11,000-kw. plant owned by the company. Construction work will be started immediately and completion is scheduled for September 15, 1930.

From a substation to be erected 66,000-volt lines will run west to El Reno and north to Enid. Lines also will connect the company's Broadway substation and the city distribution system, as well as the present plant at Belle Isle, to the new plant. Thus the plant will be connected with the company's major generating stations near Harrah, Muskogee and Ada. With its completion and that of the Lincoln Beerbower station at White Eagle the total generating capacity of the Oklahoma Gas & Electric Company system will be increased from approximately 145,000 kw. to 190,000 kw.

Friction in Power Commission Is Denied

Publicity Given by Senator to Solicitor Russell's Opinions on Pre-License Costs Indicates No Departure from Established Practice—License Asked for Lewis River

NO FOUNDATION in fact exists for the statement that friction has developed within the Federal Power Commission over the policy to be followed in the handling of accounts, the ELECTRICAL WORLD's Washington correspondent reports. Whatever concern has been felt has arisen as a result of misinterpretations growing out of the publicity accorded recent opinions given by C. A. Russell, the new solicitor of the commission. In almost every application which reaches the commission additional information is sought concerning some of the items making up the pre-license costs. In the Cumberland Falls case Solicitor Russell's opinion was intended only as an expression of view on the facts as he understood them. In the ordinary course when an item is challenged by a member of the commission's staff the memorandum is sent to the applicant, with the idea that he will explain it satisfactorily or strike it from the list.

There was no intention on the part of the commission to depart from its practice and its own regulations in the case of the much-discussed Russell opinions. Mr. Russell explained that he discussed the opinions in confidence with a newspaper man who promptly violated that confidence and started a controversy which led Senator Couzens to request copies of the opinions. It was the Senator who made them public and not the commission. It is not the intention of the commission to depart in any way from its usual practice of regarding as confidential the preliminary discussions with applicants as to items of cost.

The Inland Power & Light Company of Portland, Ore., has applied to the commission for a license covering its proposed development at the Ariel and Basket sites on the Lewis River. An initial installation of 50,000 kw. is planned at the Ariel site. Ultimately 160,000 kw. will be installed. At the Basket site it is intended to install 50,000 kw. initially, which is to be increased later to 200,000 kw. The dam at the Ariel site will be 190 ft. high, while that at the Basket site will be 285 ft. high. A preliminary permit covering the project was issued August 15, but all of the necessary engineering work had been done prior to its issuance.

A. J. Allen of Eagle, Colo., has applied for a license covering a small project on East Brush Creek in Eagle County, Colo. The power is intended for use on Mr. Allen's own property.

Aluminum Company's New Dams on Little Tennessee

Chilhowee, Tenn., about 35 miles south of Knoxville, will be the site of the first of the new dams to be built by the Aluminum Company of America on the Little Tennessee, in Tennessee and North Carolina, on which stream it already has two dams—the Cheoah and the Santeetlah—and is building a third —the Calderwood high-arch dam.

The Chilhowee dam will be a concrete structure of gravity type, 1,500 ft. long and 63 ft. high. Headwaters of the reservoir will just reach the Calderwood power house, 10 miles upstream. Flow over the dam will be controlled by twelve Stoney gates 25 ft. wide and 40 ft. high. The power house, adjacent to the dam on the right bank of the river, will contain two reaction-type turbines of 18,000 hp. each, directly connected to three-phase, 60-cycle generators. The power house will contain but one floor, a departure from the usual design.

After the completion of the Chilhowee dam, which is scheduled for January 1, 1931, an arch dam 200 ft. high will be built at Nantahala, N. C., across a narrow gorge of the Nantahala River, a tributary of the Little Tennessee. There will be no flood-control gates on the dam, the water flowing over the entire crest in a thin sheet, deflected away from the bottom of the structure by jet deflectors. An unlined tunnel, 12 ft. x 12 ft. in section, will lead from the dam to the power house, five miles downstream. The generating unit will consist of a single reaction turbine of 60,000 hp. operating under a static head of 930 ft. Work will commence at once on the Chilhowee dam and soon on the Nantahala tunnel.

Cities West, Center and East Plan for Jubilee

Elaborate plans for the celebration of "Light's Golden Jubilee" in Denver were formulated at a recent meeting of committeemen. Business men, bankers and public officials are working for it, inspired by the fact that that section of the West was a pioneer in the use of electric light and power. James C. Burger, vice-president of the Denver National Bank, is chairman of the sponsoring committee. Women's organizations, churches, garden clubs, schools and airports are included in the scope of projected plans.

Under the auspices of the Cincinnati Electric Club the jubilee will be signalized by the Cincinnati Edison Exposition, a large-scale enterprise to be held from October 20 to October 26, embracing a great number of electrical exhibits and displays of many kinds.

Prizes will be awarded at Rochester, N. Y., for the best illuminated business buildings in connection with the jubilee observance in October. Illumination of the fountain on Cobb's Hill will be one feature of the celebration, and this will be maintained as a permanent feature. An essay contest will be conducted.

Official Delegates to Tokyo Congress

Sixty-six Out of the 250 Who Will Attend from United States So Designated—European Delegates on the Way —Seventy-five Papers from United States

DELEGATES chosen by the scientific and technical societies and engineering educational institutions of this country to represent them at the coming World Engineering Congress in Tokyo are named in a list issued by Maurice Holland, executive secretary of the American committee of the congress. The number allocated to the United States by the Japanese authorities was set around 60, though the number of Americans participating will be about 250. President Hoover is honorary chairman of the American committee and Elmer A. Sperry is chairman.

The four "founder" societies — the American Institute of Mining and Metallurgical Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers and the American Society of Civil Engineers—as well as national organizations of the special lines of engineering, designated the official American representatives, who cover practically the whole range of engineering and technology in the United States. As previously announced, the party will sail for Tokyo on October 10 from San Francisco, two ships, the *President Jackson* and the *Korea Maru*, having been chartered specially for its transportation.

The list of official delegates follows:

M. W. Alexander
H. Foster Bain
George D. Barron
Edward Bartow
F. W. Bradley
George K. Burgess
Howard E. Coffin
W. H. Carrier
George S. Davison
John V. N. Dorr
Byron E. Eldred
John R. Freeman
E. H. Fritch
George W. Fuller
Mrs. L. M. Gilberth
C. E. Grunsky
Allen Hazen
H. D. Hibbard
Maurice Holland
John C. Hoyt
F. L. Hutchinson
James E. Ives
D. C. Jackson
F. B. Jewett
Lieut.-Gen Edgar Jadwin
C. M. Keys
C. W. Latimer
C. K. Leith
Wilfred Lewis
Paul M. Lincoln
Francis F. Lucas
Charles T. Main
R. R. Martel
E. C. Martin
Charles D. Marx
W. B. Mayo
C. W. Merrill
O. C. Merrill
Ralph Modjeski
L. A. Osborne
H. de B. Parsons
Asa E. Phillips
Donald B. Prentice
Antonin Raymond
Henry G. Reist
Mark L. Requa
J. V. W. Reynders
Calvin W. Rice
Robert H. Richards
Joseph W. Roe
David Rushmore
Herman Schneider
R. F. Schuchardt
C. E. Skinner
George Otis Smith
Elmer A. Sperry
Francis Lee Stuart
A. N. Talbot
Max Toltz
E. N. Trump
Daniel L. Turner
H. Bruce Walker
W. Y. Westervelt
F. C. Hanker
Charles W. Stone
William Elmer

Foreign Delegates en Route

The first contingent of foreign delegates en route to the World Engineering Congress will arrive in this country September 2 on the steamer *New York*, followed by others arriving on the *Karlsruhe* September 8, the *Bremen* September 10, the *Olympic* September 17 and other still later ships. Among these delegates are:

From Germany—Carl Koettgen, Oberbaurat Helmle, Adolpf Krauss, C. Matschoss, Graf Vitzthum, Otto Petersen, Ministerialrat Kralik, Bergrat Tuebben, Professor Probst, Emil Hayn, Charles Gorrissen, Max Eduard Hasche, Oskar von Miller, K. W. Wagner, Mr. Fiebiger, Mr. Buchholz, Mr. Lindhagen.

From England—Richard W. Allen, Lieut.-Col. A. H. S. Evans, Ernest F. C. Trench, Sir Alexander Gibb, F. Wakeham, Allen West, Frank Gill and Fay Rosencrants.

From Sweden—Axel F. Enström, Mr. Weibull.

From Jugoslavia—R. M. Aranovitch.

From Italy—Luigi Luiggi.

From France—Colonel Pernod.

From Denmark—Mr. Thomsen.

Dr. Koettgen is general director of the Siemens - Schuckertwerke, Dr. Helmle director of the Badenwerkes, and Dr. Krauss of the I. G. Farbenindustrie. Mr. Gill is a past-president of the Institution of Electrical Engineers, which he represents. Colonel Evans represents the (British) Illuminating Engineering Society, Mr. Allen the University of London and the Institute of Mechanical Engineers, Mr. Trench the Institute of Civil Engineers and Sir Alexander Gibb the Institute of Chemical Engineers.

Many American Papers for Tokyo Congress

Titles of 75 papers by American engineers, prepared for the World Congress of Engineers to be held in Tokyo beginning October 29, have been listed. Among them are:

"Welding and Cutting," C. A. Adams.
"Household Refrigeration in the United States," American Society of Refrigerating Engineers.
"Insulation of High-Voltage Overhead Transmission Lines," A. O. Austin.
"Precision Machines and Instruments for the Measurement of Length," Dr. George K. Burgess.
"High-Tension Cable Specification and Design in America," W. A. Del Mar.
"Résumé of the Stability Problem as Applied to Long-Distance Transmission of Power," Charles Le G. Fortescue.
"Telephone Communication System of the United States, "Bancroft Geherardi and F. B. Jewett.
"International Co-operation of Engineers," John Hays Hammond.
"Safety in Dam Construction," Allen Hazen.
"Technical Achievements in Broadcasting and Its Relation to National and International Solidarity," Institute of Radio Engineers.
"Economic and Operating Considerations in Railroad Electrification in the United States," Dugald C. Jackson.
"Extra-High Voltage Transmission with Special Reference to American Practice," J. P. Jollyman and E. R. Stauffacher.
"Remote Operating Supervision and Control of Electric Power Stations and Substations," Chester Lichtenberg and F. Zogbaum.
"Some Engineering Aspects of Electric Lighting," John W. Lieb.
"American Developments in Diesel Engines," L. H. Morrison and Edgar J. Kates.
"American Power - Station Electrical Equipment," F. D. Newbury.
"Economics of Water Versus Steam Power," G. A. Orrok.
"Résumé of Present Methods of Development and Construction of High-Voltage Interconnection of Electric Systems in the United States," Farley Osgood, W. E. Mitchell, P. M. Downing and E. C. Stone.
"Lightning," F. W. Peek.
"Rolled Steel in the Construction of Electrical Machines," Henry G. Reist.
"Standardization," C. E. Skinner.
"Recognition of the Engineer and the American Engineering Societies," Elmer A. Sperry.
"Refrigeration in the Preservation of Food," H. F. Taylor.
"Operation of Turbo-Generators on a Total Temperature Rather than a Temperature-Rise Basis," Philip Torchio, W. J. Foster and F. D. Newbury.
"Industrial Progress Made Through Research and Its Economic Importance," Willis R. Whitney.
"Engineering Education in America," W. E. Wickenden.

New Englanders to Convene in Early September

Plans are complete for the twenty-first annual convention of the New England Division of the National Electric Light Association, which will be held at the Hotel Griswold, New London, Conn., September 9-12, a diversified program of business and sports marking the occasion. On Monday morning an accounting session will be held under Chairman J. W. Lester, with a general discussion of eighteen questions submitted by member companies, remarks by F. W. Herbert of New York and a paper on "The Distribution of Storeroom and Transportation Expenses" by W. F. Stevens of the Boston Edison company. In the evening of that day Lieutenant-Governor Rogers of Connecticut will welcome the delegates at the opening general session, and among the features will be addresses by President I. W. Day, President M. S. Sloan of the national association and Managing Director Paul S. Clapp, followed by reports of standing committees on education, electricity in agriculture, rural electric service and taxation.

The merchandising, power and lighting bureaus will occupy the Tuesday morning session under Chairmen D. D. Debard, A. W. Milliken and R. L. Brown, Jr. Addresses will be given by Sarah H. Hunter of Boston, John L. Madden, vice-president Metropolitan Life Insurance Company, and Representative Charles A. Eaton of New Jersey.

Home service will be featured at a women's session Wednesday morning under Miss A. M. Baker of Hartford, and the program will include an address on New England by Dudley Harmon, executive vice-president New England Council. In the evening there will be a public relations session under Chairman L. D. Gibbs and an address by R. T. Higgins, chairman of the Public Utilities Commission of Connecticut.

The engineering session Thursday morning will close the convention, and the program under Chairman C. A. Mayo includes addresses by A. D. Bailey, chairman National Engineering Section, and Major H. S. Bennion, national director of engineering, and a paper on "Advanced Practice in Distribution" by F. B. Bolster, chief supervisory engineer Rome Wire Company. Talking motion pictures will be given at many of the sessions.

Briefer News

MUNICIPAL PLANT AGITATED FOR RUSSELLVILLE, ARK.—The question of forming an "improvement district" at Russellville, Ark., with the object of establishing a municipal light and power plant and distribution system, costing probably $243,400, is to be submitted to a referendum.

OTTER TAIL POWER COMPANY REDUCES RATES IN NORTH DAKOTA.—Reduced electric rates proposed by the Otter Tail Power Company for application in 48 North Dakota towns have been approved by the North Dakota Board of Railroad Commissioners. The company was also authorized to build three new rural transmission lines.

KAMLOOPS, B. C., FAVORS PRIVATE ENTERPRISE ON ADAMS RIVER.—Despite the fact that the 25,000-hp. Adams River power project of the West Kootenay Power & Light Company may encroach on the 50-mile-radius power rights zone held by the city, the Kamloops (British Columbia) City Council went on record unanimously in favor of the project, notwithstanding that a bylaw recently submitted for sale of the municipal plant to the Canadian Waterworks & Electric Company was defeated and bitterly opposed by some of the Council.

MARYLAND UTILITIES ASSOCIATION MEETS.—For the midyear meeting of the Maryland Utilities Association on Friday, August 30, at Ocean City the electric group scheduled four addresses, to be followed by a general discussion. George W. Kable, director of the national rural electric project, was to speak on that enterprise; C. A. Oettinger on Edison and the jubilee, W. R. Winans on "Your Public and Ours," and J. W. McIver on "Recurring Revenue."

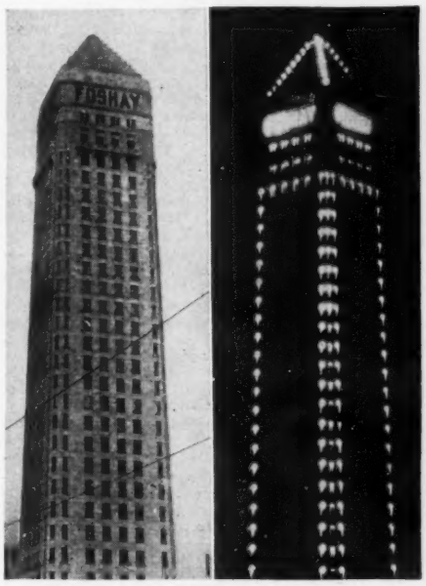
NEW SERVICE BUILDINGS FOR PACIFIC GAS & ELECTRIC.—Plans for the construction of service buildings to cost approximately $1,000,000 have been announced by the Pacific Gas & Electric Company, San Francisco. These new buildings will occupy a block recently purchased at Eighteenth, Shotwell, Nineteenth and Folsom Streets. The company also plans to remodel two existing buildings on this property, one of these to be for warehouse purposes and the other for electric and gas distribution headquarters.

ALABAMA POWER COMPANY PROTESTS AGAINST FURTHER RATE REDUCTIONS.—Exceptions have been filed by the Alabama Power Company to a report filed by the chief engineer of the Alabama Public Service Commission recommending further revisions in the company's rates. The power company asserts that the rate-revising orders already issued by the commision have reduced the revenues of the company by approximately $396,000 a year and that the revisions now proposed would further reduce them by $484,000 a year and result in confiscation.

WOULD DEVELOP POWER BY WATER FROM SIX OREGON LAKES AND MCKENZIE RIVER.—Wallace Huntington of Portland, Ore., has filed an application with the state engineer for authority to store 15,000 acre-feet of water from Clear, Fish, Lava, Lost, Mud and Big Lakes and the McKenzie River and to appropriate 750 sec.-ft. of such stored water for the purpose of developing electric power in Linn County.

WILL BUILD LINE FROM RAYMOND TO ABERDEEN, WASH.—The Western Washington Electric Light & Power Company, Montesano, Wash., will proceed immediately to construct on steel towers and poles a 25-mile high-voltage transmission line between Aberdeen and Raymond, Wash., with a 5½-mile branch to the new North River hydro-electric plant.

Foshay Tower Dedicated in Minneapolis



ELABORATE three-day plans covering August 30 and 31 and September 1 were made for the dedication of the Foshay Tower in Minneapolis, headquarters for W. B. Foshay & Company, who have many utility and other business interests in various parts of the country. The new building, one of the most conspicuous in the city named, is in the shape of the Washington Monument at the national capital. The tower rises 32 stories from the center of a square block, reaching a total height of 447 ft. above ground level. Here are shown a daylight and a night view of all but the lower portion.

HICKSVILLE, OHIO, DECIDES FOR MUNICIPAL PLANT; SOME IN SANDUSKY WANT ONE.—The town of Hicksville, Ohio, has approved by a vote of 404 to 176 the proposal for a municipal light and power plant. Petitions for a vote in November on establishing one are in circulation at Sandusky, where the City Commission may adopt electrical operation for its waterworks.

DROUGHT IN NEBRASKA LIMITS OUTPUT AT KEARNEY.—With the summer of 1929 characterized as the driest in many years, R. F. Pfeiffer, manager of the Kearney (Neb.) branch of the Central Power Company, has petitioned the state board for permission to draw more water from the Platte River. More than 1,400 sec.-ft. of water is being received at North Platte, but the Kearney, Overton and Duncan headgates are dry.

MINNEAPOLIS FIRMS SEEK TO ESTABLISH OWN POWER PLANT.—Twenty-one manufacturing and mercantile companies in the wholesale district of Minneapolis have petitioned the City Council for permission to construct an electric generating plant of their own and string their own wires. The firms declare that their district "has not progressed as it should" owing to the "high overhead of electric rates."

MONTOUR FALLS AND HORNELL, N. Y., TO BE CONNECTED BY 110-KV. LINE.—The New York Central Electric Corporation is reported to plan a 110-kv. transmission line from Montour Falls, N. Y., to Hornell, a distance of about 50 miles, and probably the erection of a substation near Hornell. The new line will connect with the 110-kv. line between Geneva and Elmira. Several hundred thousand dollars may be expended.

MOBILE'S NEW GENERATING PLANT NEARLY READY.—Work will soon be completed on the Mobile power plant of the Southeastern Production Company, a subsidiary of the Southeastern Power & Light Company. The plant will furnish power and light for the new plant of the International Paper Company at Mobile. It consists of an 8,000-kw. steam generating station with one 6,000-kw. non-condensing turbine and one 2,000-kw. condensing turbine. The generating room is 35 ft. x 110 ft. x 40 ft., and the boiler room is 55 ft. x 100 ft. and 80 ft. high.

NORTHWEST INSPECTORS TO MEET AT VANCOUVER, B. C.—The annual convention of the Northwest Section, International Association of Electrical Inspectors, will be held in Vancouver, British Columbia, September 9-11. Among the expected speakers are R. L. Laing, fire marshal, Seattle; Dr. M. G. Lloyd, Bureau of Standards, Washington, D. C.; H. B. Kirkland, secretary Society for Electrical Development, New York; W. S. Boyd, secretary

Western Section, I. A. E. I., Chicago; V. H. Tousley, secretary N. F. P. A., Chicago; J. C. Forsyth, Board of Fire Underwriters, New York; B. S. McKenzie, secretary Canadian Engineering Standards Committee, Ottawa, and A. Penn Denton, executive electrical engineer for the N. E. M. A.

EXPANSION OF MASON CITY (IOWA) PLANT.—The People's Gas & Electric Company has started upon an expansion of its Mason City (Iowa) generating plant, scheduled to be completed late this year, which will double its capacity. The new unit will provide space for installation of a 10,000-kw. unit, making a total installation of 20,500 kw., of which 3,000 kw. will be transmitted to Waterloo.

INDIANA COMMISSION LOSES PERSONNEL.—The approaching hearing on the merger of Insull railway, electric and other properties, involving values of $70,000,000, for which the Indiana Public Service Commission has long been preparing, may, it is said, be further complicated by the fact that the reorganized commission now commands the services of only one of the original field accountants who worked on the case for ten months. A. C. Kamplain, director of field investigation, has resigned after a dispute about remuneration. Analytical summaries, digests and exhibits will presumably have to be prepared from the mass of field notes already compiled.

OIL-ELECTRIC LOCOMOTIVE PULLS HEAVY PASSENGER TRAIN 60 MILES AN HOUR.—An oil-electric locomotive on Monday hauled the second section of the International Limited (Chicago) train of the Canadian National Railways on a run of 334 miles from Montreal to Toronto, keeping pace with the first section, which was pulled by a giant steam locomotive, and came to rest in as good mechanical condition as when it started. According to the New York *Times*' correspondent, the oil-electric averaged not less than 60 miles an hour and for a long distance ran at 70, even hitting 75. Fuel osts were $80 for the coal-fired engine and $25 for the oil-electric.

NORTHWEST POWER COMPANY IS SUBSIDIARY OF PORTLAND ELECTRIC POWER.—At a hearing before the Oregon state engineer in connection with the application of the Northwest Power Company for a permit to appropriate water from Marion Lake and the Santiam River for hydro-electric development purposes, C. B. Coldwell, vice-president Portland Electric Power Company, testified that his company owns and directs the activities of the Northwest Power Company. Previously the identity of those behind the applicant had not formally been revealed. Mr. Coldwell is the acting president of the subsidiary utility, while J. G. Kelly is the agent employed to acquire water and property rights for carrying out development projects under the name of Northwest Power Company. At the request of the city attorney of Salem, one of the protestants against the granting of the application, the hearing was continued until September 23.

Coming Meetings

[A complete directory of electrical associations, with their secretaries, is published in the first issue of every volume. For latest list see issue of July 6, page 46.]

Rocky Mountain Division, N.E.L.A.—Hotel Colorado, Glenwood Springs, Colo., Sept. 2-4. O. A. Weller, Public Service Co. of Colorado, Denver.

Colorado Utilities Association—Glenwood Springs, Colo., Sept. 2-4. O. A. Weller, Denver.

American Institute of Electrical Engineers — Pacific Coast convention, Santa Monica, Calif., Sept. 3-6. F. L. Hutchinson, 33 West 39th St., New York.

Pennsylvania Electric Association—Bedford Springs Hotel, Bedford Springs, Pa., Sept. 4-6. H. A. Buch, Telegraph Building, Harrisburg, Pa.

International Association of Electrical Inspectors—Northwest Sections, Vancouver, B. C., Canada, Sept. 9-11. F. D. Weber, P.O. box 745, Portland, Ore.

Association of Edison Illuminating Companies—Chateau Frontenac, Quebec, Sept. 9-12. P. S. Millar, 80th St. and East End Ave., New York.

New England Division, N.E.L.A. — Hotel Griswold, New London, Conn., Sept. 9-12. Miss O. A. Bursiel, 20 Providence St., Boston.

American Welding Society—Cleveland, Sept. 9-13. M. M. Kelly, 29 West 39th St., New York.

Empire State Gas and Electric Association—Electric Meter Section, New York Edison Auditorium, New York, Sept 12-13; annual meeting, Saranac Inn, Saranac Lake, N. Y., Sept. 19-20. C. H. B. Chapin, Grand Central Terminal, New York.

American Electrochemical Society — Hotel William Penn, Pittsburgh, Sept. 19-21. C. G. Fink, Columbia University, New York.

Illuminating Engineering Society — Bellevue-Stratford, Philadelphia, Sept. 24-27. A. B. Oday, 29 West 39th St., New York.

Great Lakes Division, N.E.L.A. — French Lick Springs, Ind., Sept. 26-28; Engineering Section, Lorain Hotel, Madison, Wis., Oct. 23-26. T. C. Polk, room 110, 140 South Dearborn, St., Chicago.

American Electric Railway Association —Atlantic City, Sept. 30-Oct. 4. J. W. Welsh, 292 Madison Ave., New York.

Association of Electragists International—New Ocean House, Swampscott, Mass., Sept. 30-Oct. 3. L. W. Davis, 420 Lexington Ave., New York.

National Safety Council — Stevens Hotel, Chicago, Sept. 30-Oct. 4. W. H. Cameron, 108 East Ohio St., Chicago.

National Electrical Manufacturers' Association—Wardman Park Hotel, Washington, Oct. 7-11. S. N. Clarkson, 420 Lexington Ave., New York.

American Society of Mechanical Engineers—National fuel meeting, Bellevue-Stratford Hotel, Philadelphia, Oct. 7-10. C. W. Rice, 29 West 39th St., New York.

Kansas Section, N.E.L.A. — Wichita, Oct. 17-18. H. Lee Jones, Kansas Gas & Electric Co., Wichita, Kan.

Public Utilities Association of West Virginia—Charleston, W. Va., Oct. 23-24. A. Bliss McCrum, P. O. Box 1483, Charleston, W. Va.

American Engineering Council—Mayflower Hotel, Washington, Oct. 24-25. L. W. Wallace, 26 Jackson Place, Washington, D. C.

DROUGHT SHUTS DOWN THREE HYDRO UNITS AT LOUISVILLE.—Six dry weeks in the Ohio Valley watershed forced the shutting down of three of the eight 10,000-kw. generators at the Ohio Falls station of the Louisville Gas & Electric Company last week in order to conserve navigation, and the supply to the other five generators was reduced. The load was taken by the company's reserve steam equipment.

EXPANSION IN CLEVELAND AND ASHTABULA.—Work is progressing rapidly on the new equipment of the Cleveland Electric Illuminating Company, President Frank L. Dame of the North American Company reports. At Avon power station the fourth turbo-generator of 35,000 kw. rating will go into operation in October. At Newburgh, in the iron and steel district of Cleveland, an 80,000-kw. transformer station is under construction. At Canal Road station, in the commercial district, two new rotary converters of 6,500 kw. capacity are being added. Excavations and marine work for the company's new 400,000-kw. power plant at Ashtabula are nearing completion.

MONTREAL LIKELY TO SELL ITS NEW CITY-GENERATED POWER TO UTILITY FOR DISTRIBUTION.—Recent developments indicate that the city of Montreal will sell the power which it will develop from its aqueduct canal to the Montreal Light, Heat & Power Consolidated, which in turn will utilize it to illuminate the city streets, public buildings, parks, etc. At the beginning of May the city voted a loan of $4,587,500 for the extension of the aqueduct system and the development of electric power from the aqueduct canal by the erection of a power plant and the digging of a supplementary canal to the St. Lawrence River. It was proposed at the time that the plant should furnish some 16,000 hp. and that this power should be utilized by the city directly. However, the cost of distributing the power presents such an obstacle that it is now thought the eventual outcome will be that the city will sell the power to the company, which will do the distribution.

TEXAS WILL HAVE 2,000-MILE TRANSMISSION LOOP.—In addition to completing its wooden-pole transmission line from Rocksprings, Tex., to the line of Edwards and Sutton Counties, the Central Power & Light Company has begun the construction of a similar line from Rocksprings to Uvalde. The latter will be of 66,000 volts and when compleated will join together a loop line of a length of more than 2,000 miles—asserted to be the longest loop transmission electric power line in the United States. With the completion of this line in the next three or four months the company will do away with several local plants, including those at Crystal City, Camp Wood and Rocksprings.

The line under construction will tie in with the West Texas Utilities Company's line at Sonora and with the Central Power & Light Company's line at Uvalde and will give this company a 66,000-volt loop through Laredo, San Antonio, Del Rio, Uvalde, San Angelo and the plants on the Devil's River.

COMING UTILITY EXPANSION IN NEW ORLEANS.—Among a list of enterprises to be undertaken in New Orleans in the near future and to involve an expenditure of $346,000,000, the news bureau of the New Orleans Association of Commerce includes "expansions necessary to provide for increasing power, gas and transportation demands in proportion to the growth of the city," which will cost the New Orleans Public Service, Inc., $10,000,000, "plus $8,500,000 for replacements within the next five years," or a total of $18,500,000. This information, the bureau says, has been obtained by the Association of Commerce from sources considered as reliable other than Public Service, Inc.

Interstate Company Asks New Hearing in Nebraska

The Interstate Power Company has asked the Nebraska Supreme Court for a rehearing of the case in which it was permanently enjoined from charging less than 8 cents maximum rates at Hartington, where the Western States Utilities Company built a competing plant under a contract to hand it over to the city when net revenues repay cost and interest. The company maintains that the court erred in finding that the 6-cent rate it announced was for the purpose of destroying its competitor, when in fact it was for its own protection, benefit and preservation. It is also averred that the court erred in the assumption that a compelled competitive rate, though it is made for the purpose of preventing confiscation of property through loss of patronage, is unlawful, in any event, if it would injure or interfere with the business of another company.

Furthermore, the appellant maintains that the fact that a company is doing business in several communities does not restrict that company nor place it at any disadvantage in its competitive actions in one of these communities, if its actions there are for the purpose of protecting its properties and of meeting competition, any more than if it was operating in that single place alone. In view of the fact that the local company, operated as the Cedar Light & Power Company, is a subsidiary, it is contended that the court erred in finding that the two companies had conspired. It is also contended that as the 8-cent rate has resulted in the loss of most of the business, it should be permitted to try out a lower rate, since it must combat the lure of municipal ownership offered by its competitor. Attention is also called to the fact that if the decision stands it will result in establishing a monopoly instead of preventing one, which is the limit of the commission's power.

Recent Court Decisions

INSTRUCTION THAT CERTAIN TRANMISSION WIRES SHOULD HAVE BEEN KEPT "TAUT" DID NOT IMPOSE TOO HIGH A DEGREE OF CARE.—The Supreme Court of Missouri sustained a verdict for the plaintiff in Thompson vs. City of Lamar, a suit for damages because of the injury of the plaintiff while working on a roof above which the city's 2,300-volt wires passed. Evidence that the workman tried to keep at a safe distance from the wires but that the wind blew them against him, the court said, could not be construed to show that he had been guilty of contributory negligence as a matter of law, nor could the defendant claim that evidence that the plaintiff fell against the wires while dizzy or faint relieved the city from liability, since the fall was not the proximate cause of his injury. An instruction that such wires should be "taut" and not "sag" or "sway" did not mislead the jury into assuming the necessity for too high a degree of care, since the meaning of these words is well known. (17 S.W. [2d] 960.)*

COMMUNITY CAN CONDEMN COMPANY'S RIGHT-OF-WAY WHERE PROPOSED USE OUTWEIGHS EXISTING ONE.—The Texas Court of Civil Appeals overruled the contention of the Central Power & Light Company in an action against Willacy County that the county could not condemn land occupied by the company's right-of-way except by expressed or implied legislative sanction. The court said that property already devoted to one public use may be taken for another where it is found that the proposed use is of so great importance to the public as to require that the existing use, if of less importance to the public, shall give way to it, provided that the proposed enterprise or use cannot be accomplished in any other practical way. The court held, however, that the county must not only pay the reasonable market value of the easement but also the value of all improvements which cannot be removed from the right-of-way and the necessary expense of removing such as can be salvaged. (14 S.W. [2d] 102.)

PRESENCE OF EXCESSIVE VOLTAGE MUST BE SHOWN BEFORE DEATH FROM SHOCK CAN BE ATTRIBUTED TO NEGLIGENCE OF COMPANY SUPPLYING ELECTRICITY.—In Anderson vs. Fort Dodge, Des Moines & Southern Railroad Company and Fort Dodge Creamery Company damages were sought for the death of a youth from electric shock received through a drop cord placed above a knife switch in a closet. Another person, failing to rescue the boy by turning the switch, tore down the cord, but too late. The Supreme Court of Iowa held that there was no causal relation between the location of the cord and the boy's death and that a directed verdict in favor of the creamery company, alleged to have installed the cord in connection with a refrigerator, was justified. As to various acts of negligence in installation, alleged against the railroad company, which supplied the energy, the court held that the trial judge rightly withdrew these specific grounds of negligence from the consideration of the jury and allowed it to consider only a general accusation based on the doctrine of *res ipsa loquitur* ("the thing speaks for itself"), because it was necessary to establish the presence of excessive voltage, disputed by the company, before specific acts of negligence could be established. The court said further that the general specification of negligence covered all the other specifications. Under this instruction, the jury found for the defendant company, and the Supreme Court refused to upset the finding. (226 N. W. 153.)

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

Commission Rulings

WHAT CONSTITUTES A PUBLIC UTILITY?—The Tennessee Railroad and Utilities Commission, in granting authority to the Holston River Power Company to build a dam on the South Fork of the Holston and rejecting the application of a rival company, the Tennessee Eastern Power Company, dealt with the latter's contention that the Holston company was not a public utility. The commission in this connection said: "The Tennessee Eastern Power Company contends that even if a certificate were issued to the Holston company by this commission and a license were issued to it by the Federal Power Commission, the Holston company could not acquire these riparian rights by condemnation, for the reason that the Holston company is not a public utility. The Holston company is incorporated under a charter authorizing it to make water-power developments on the South Fork of the Holston River and also authorizing it to condemn land for that purpose. It is true that this company is not at this time as to such proposed development a public utility, but if it should be granted a certificate by this commission and a license by the Federal Power Commission, it would then become a public utility, and as such under these grants and under its charter it would have conferred upon it the right to condemn these lands and be clothed with the power of eminent domain. The contention is made by the Tennessee Eastern Power Company that the Holston company would not even then be a public utility, because it proposes to sell all or the major portion of its power to the American Cyanamid Company and not to distribute it to the public generally. On the hearing of this case and in the application for a certificate filed by the Holston company it appears that said company agrees, if a certificate is granted to it, to distribute such power as this commission may require for public utility purposes, which would thereby make it a public utility. Notwithstanding these contentions made by the Tennessee Eastern Power Company the act of 1923 requires that any party desiring to make water-power developments on the streams of the state shall file application with the commission for a certificate of convenience and necessity, and that such certificate shall be granted before such party shall be permitted to make such development, the intention of the act being to prevent exploitation of water power and other natural resources. Under the terms of the act, such application would have to be filed with this commission, regardless of whether the applicant is a public utility or not, and regardless of whether it proposes to devote the power to a public use."

News About Men of the Industry

J. S. Avery New Vice-President of Utica Utility

John S. Avery, the new vice-president and general manager of the Utica Gas & Electric Company, Utica, N. Y., who succeeded Frank B. Steele, was until recently general manager of the Metropolitan Edison Company, Reading, Pa., the largest subsidiary of the General Gas & Electric Corporation and of the New Jersey Power & Light Company, Dover, an affiliated company. Mr. Avery is a native of Rochester, N. Y., and was graduated in engineering from Cornell University, Ithaca, N. Y., in 1899. At one time he was connected with properties in the southeastern part of New York State, now forming part of the Charles H. Tenney & Company group of Boston, Mass. Later he was engaged in the machinery manufacturing business at Rochester, N. Y., and about 1918 returned to the utility business with the Metropolitan Edison Company.

CECIL W. BROWN, for the past five years chief engineer of the Connecticut Power Company, has been appointed manager of the New London division.

WALTER WHETSTONE, president of the Southern Cities Utilities Company, arrived in New York August 20 aboard the *Ile de France* after visiting southwestern Europe.

EDWIN W. LAWRENCE will serve temporarily as president of the Central Vermont Public Service Corporation, established to merge western and central Vermont utilities, as previously announced in the ELECTRICAL WORLD. Mr. Lawrence has conducted a law practice in Rutland since 1902.

FLOYD D. CAMPBELL, general manager of the Broad River Power Company, Columbia, S. C., has been appointed vice-president and general manager of the Staten Island Edison Company, New York. Both properties are controlled by the Associated Gas & Electric System. Before removing to South Carolina, Mr. Campbell was connected with the Pennsylvania Edison Company, another subsidiary of the Associated Gas & Electric Company, at Easton, Pa.

GEORGE A. JACOBS, president and founder of the Dudlo Manufacturing Company, a subsidiary of the General Cable Corporation, of which he is the vice-president and member of the executive committee, and Wendell C. Glass, plant manufacturer of the Dudlo Manufacturing Company, have tendered their resignations. Mr. Jacobs and Mr. Glass, together with other associates, will organize a new company to engage in the manufacture of magnet wire windings and electrical specialties for the automotive, radio and electrical industries. The main factory and home offices of the new company will be in Fort Wayne, Ind. Mr. Jacobs started the original Dudlo Manufacturing Company in Cleveland, Ohio, and in 1911, a little more than a year after its organization, he moved the plant to Fort Wayne, where it has grown to be one of the largest industries in the city.

B. W. Sinclair Assumes Broader Duties in Atlanta

B. W. Sinclair, formerly superintendent of hydro-electric plants for the Georgia Power Company with headquarters at Tallulah Falls, has been appointed superintendent of production in the electrical operating department, with headquarters in Atlanta, following the co-ordination of all electric power production units under one head. One of the outstanding figures in the development of hydro-electric power in Georgia, Mr. Sinclair was actively engaged in the construction of the six great hydro-electric generating stations which comprise the Tallulah-Tugalo system of the company in northeast Georgia.

Upon graduation from the Georgia Institute of Technology in 1910, Mr. Sinclair entered the employ of the Northern Construction Company, which began the work of building the Tallulah Falls power plant. Beginning as a transit man, he remained with the construction forces after the development was taken over by the old Georgia Railway & Power Company until Tallulah Falls plant and Mathis dam were completed, being promoted to the position of superintendent of construction while doing this work. In 1915 Mr. Sinclair returned to the Atlanta offices of the power company and served in the land department for a year. He then returned to assist Charles G. Adsit, engineer in charge of building the Tallulah-Tugalo system, as superintendent of construction. When the last of the great plants was completed Mr. Sinclair was placed in charge of the system as superintendent of hydro plants, remaining in that position until the present advancement.

Charles Piez Nominated for A.S.M.E. Presidency

Charles Piez, chairman of the board of directors of the Link-Belt Company, Chicago, has been nominated for the presidency of the American Society of Mechanical Engineers by the regular nominating committee, meeting recently in Chicago. Mr. Piez has been identified with the Link-Belt organization since 1889, the year in which he was graduated from Columbia University. Mr. Piez was chosen in November, 1917, to be vice-president and general manager of the United States Shipping Board Emergency Fleet Corporation. When he resigned to return to his private business he continued as president of the Link-Belt Company until 1924, when he became chairman of the board with full executive control of the company and its various subsidiaries. Mr. Piez is a member of the American Institute of Mining and Metallurgical Engineers, Western Society of Engineers and of other technical societies.

J. F. LINCOLN, president of the Lincoln Electric Company, recently sailed on the *Leviathan* for London, England, where he will take charge of a demonstration for European engineers of the electronic tornado process of carbon arc welding, which, since its inception, it is claimed has revolutionized the method of automatic welding in this country. The demonstration will take place at the Allen Liversidge plant. The demonstration has been arranged in answer to numerous requests from engineers and manufacturers in all parts of Europe.

N. H. COIT, for the last five years general manager of the Florida Public Service Company, with headquarters in Orlando, Fla., has been named general manager of the Broad River Power Company, Columbia, S. C., to succeed Floyd D. Campbell, who has transferred his interests to Staten Island. G. C. HYDE, superintendent of the Florida properties, has been promoted to be general manager of the Florida Public Service Company. Mr. Coit, a native of Denver, Colo., has had twelve years' experience in the public utility field. He was formerly connected with the Western Public Service Company in Nebraska, serving as local manager at Auburn, Neb., for five years. For one year he was assistant commercial manager of the Pennsylvania Edison Company at Easton, Pa. Then he was transferred to Florida. Mr. Hyde has had a number of years' experience in the public utility field. He has been general superintendent of the Florida Public Service Company for several years, and formerly was in charge of all the company's ice plants.

G. S. Merrill Heads Institute Committee

George S. Merrill, who has been appointed chairman of the production and application committee of the American Institute of Electrical Engineers, has a splendid background of experience to aid in directing this important committee. Following graduation from Case School of Applied Science, Cleveland, in 1907, he immediately joined the engineering department of the National Lamp Works at Cleveland. After several months of preparatory work, Mr. Merrill was placed in charge of life testing, in which capacity he served for several years. He then devoted several years to the study of rate forms and participated in much of the early work of the rate research committee of the N.E.L.A.

Mr. Merrill has always been especially interested in the study of light from an economic viewpoint. His knowledge of methods of promoting the use of electric lighting service prompted the International General Electric Company to send him abroad in 1923-24 to further the technical development of lighting service in European countries. For several years after his return from Europe Mr. Merrill had charge of the technical publicity work for the National Lamp Works. For several years Mr. Merrill was chairman of the membership committee of the Illuminating Engineering Society. He is a member of a subcommittee of the lamp committee of the National Electric Light Association and a representative of the A.I.E.E. on the sectional committee dealing with base and socket threads. Mr. Merrill will also be remembered as chairman of the tour committee for last year's International Illumination Congress and is the United States representative on the International Commission Committee dealing with "Lighting Education."

R. O. Sweezey has been appointed president of the Beauharnois Light, Heat & Power Company to fill the vacancy caused by the recent resignation of Frank P. Jones.

Colonel James C. Roop has been chosen to formulate the federal government's budget. Colonel Roop, a product of the University of Pennsylvania's electrical school, has entered upon the duties incident to the preparation of the detailed plan for forthcoming government expenditures. Since the total amount involved now is running close to $4,000,000,000 annually, made up of tens of thousands of items covering 1,400 printed pages, the task on his shoulders is a Herculean one. Trained in his years of service with the J. G. White Management Corporation, Woods Brothers Construction Company and in electric railway operation, Colonel Roop has had the experience to qualify him to weigh the relative merits of proposed expenditures.

R. Linsley Shepherd has recently resigned from the market analysis department of the Electrical World and associated papers to affiliate himself with the bureau of publication of the Bell Telephone Laboratories, Inc., New York. Mr. Shepherd has been identified with the Electrical World since 1922. A native of North Haven, Conn., and a graduate of Sheffield Scientific School of Yale University, he spent a year and a half with the Public Service Corporation of New Jersey before undertaking his more recent editorial duties. Mr. Shepherd is a member of the A.I.E.E.

Frank H. Cothran has been appointed vice-president and general manager of the Beauharnois Construction Company, a subsidiary of the Beauharnois Power Corporation, where he will be in full charge of development work and placing of contracts for the new power canal on the St. Lawrence River. A hydro-electric engineer of note, Mr. Cothran has been vice-president and general manager of the Duke-Price Power Company and the Quebec Development Company and, more recently, chief engineer of the Piedmont & Northern Railway.

A. M. Candy New Chairman of Welding Committee

A. M. Candy, who was appointed chairman of the electric welding committee of the American Institute of Electrical Engineers, as announced in the August 10 issue of the Electrical World, is well qualified to direct the activities of this committee, having devoted his attention to that special field since 1916. Following graduation from the University of Nebraska, he immediately entered the apprenticeship course of the Westinghouse Electric & Manufacturing Company at East Pittsburgh. With a background of fourteen months experience in the shop manufacturing, testing and winding departments, he became locomotive inspector of the locomotives for the New York terminal electrification of the Pennsylvania Railroad.

Returning to the plant of the Westinghouse company, he engaged in sales work for a short period of time and then became identified with the general engineering department to engage in commercial engineering work. In the summer of 1916 Mr. Candy took over the arc-welding application work in the general engineering department.

Glen L. Jackson has been named sales manager of the California Oregon Power Company and the Mountain States Power Company and J. J. Buchter has been named merchandise manager of both properties. H. L. Bromley has been named advertising manager of both companies.

Obituary

T. Lincoln Townsend, vice-president of the National Electrical Supply Company, Washington, D. C., and for many years an outstanding leader of the Republican party in the District of Columbia, died at his home in that city August 20. Death was due to heart disease, from which he had been suffering for about a year. Thirty years ago Mr. Townsend removed from Philadelphia to Washington, and as a resident of the national capital he was identified with many movements for its improvement. For nearly twenty years he was a member of the executive committee of the Republican state committee and during the past four years had been secretary. He was a delegate to the last Republican national convention and during the national Republican compaigns within the past quarter of a century he had taken a prominent part. Mr. Townsend had been connected for many years with the National Electrical Supply Company and at the time of his death was vice-president. He was also known in the electrical world as an original developer of radio apparatus for sending and receiving messages at sea. Mr. Townsend was 63 years of age.

Charles Currie, Cleveland, Ohio, formerly president of the Northern Ohio Traction & Light Company, died August 14, following an attack of acute indigestion, while on vacation in Massachusetts. He had lived in Cleveland since 1916, when he retired as president of the Northern Ohio Traction & Light Company. Mr. Currie started his career in Canada. Born in Toronto March 8, 1868, he joined the London Street Railway Company when a young man and became superintendent. The Everett, Moore Syndicate took over the London Street Railway system a short time later and transferred Mr. Currie to Lima, Ohio, making him superintendent of the street railway company there. Later the syndicate transferred him to Cleveland as superintendent of the street railway company. On August 20, 1901, the syndicate sent him to Akron, where he remained as vice-president and general manager of the Northern Ohio Traction & Light Company until 1916, when Hodenpyl, Hardy & Company took over the company which became the present Northern Ohio Power & Light Company. At the time of his death Mr. Currie was a director of various industrial enterprises, including the Northern Ohio Power & Light Company.

Financial and Statistical News

ELECTRICAL EQUIPMENT STOCKS have had their innings of late, with substantial advances in the leading issues. Railroad electrification, airport lighting and radio developments have been important factors and are likely to be more important in the future. The growing trend toward electrically propelled ships is also a favorable factor for the equipment firms.

——AVERAGES CHANGED VERY LITTLE in the utility market. The volume of trading, although large, had comparatively little effect on prices.

——THE BOND MARKET SHOWS LITTLE SIGN OF REVIVAL from one of the dullest periods on record. New issues have been few during recent weeks, but a revival of new financing is anticipated for the early autumn.

U. G. I. Stockholders Approve Stock Increase

At a special meeting held August 27 stockholders of the United Gas Improvement Company authorized an increase in the company's capital stock from 6,000,000 shares of $50 par value to 40,000,000 shares of no par value, consisting of 5,000,000 preferred and 35,000,000 common shares. The new stock will be issued on the basis of one-eighth of a share of preferred and five shares of common stock for each of the 3,974,867 shares of $50 par stock now outstanding.

In addition to the 19,874,335 shares of common stock and 496,858⅜ shares of preferred stock to be issued for the old stock, the stockholders' action authorized the issuance and disposal of the remainder of the authorized but unissued shares from time to time for such considerations and upon such terms and conditions the directors may determine. A 10 per cent allotment of the no-par common stock will be offered for subscription at $20 a share to common-stock holders of record of October 31, such stock to be paid for on or before December 31 and to participate in dividends paid after January 1, 1930. Dividends on the no-par common stock will be inaugurated at the rate of $1 a share annually, the first quarterly dividend of 25 cents a share to be payable December 31. The preferred stock will be placed on a $5 annual dividend basis on the same date.

New York Edison Increases Capitalization

The New York Edison Company has filed notice with the Secretary of State in Albany of an increase of 900,000 shares in its authorized capital stock to 5,208,080 shares. There were approximately 4,300,000 shares outstanding on Dec. 31, 1928. All of the additional shares authorized will be sold to the parent company for $50 a share. The shares have no par value. The proceeds of $45,000,000 received in this manner represent the capitalization of construction expenditures of the New York Edison Company and subsidiaries. The Consolidated Gas Company is selling $78,000,000 additional stock to its shareholders and it is believed that a large part of the new capital will be devoted to the elctrical companies of the system.

ENGINEERS PUBLIC SERVICE CHANGES STOCK CONVERSION BASIS.—Charles W. Kellogg, president of the Engineers Public Service Company, has announced that more than 160,000 shares of the company's $5 dividend convertible preferred stock had been converted into common stock and that the basis of conversion therefore changed automatically from sixteen shares of common stock for each ten preferred shares to fifteen common shares for each ten preferred, for the last 160,000 shares outstanding.

Spanish Utilities Face Promising Future

After making an investigation of industrial conditions in southwestern Europe, Walter Whetstone, president of the Southern Cities Utilities Company, predicted the same profitable electric development for this region that has been realized in the United States. Last week Mr. Whetstone returned from Spain, where he directed the reorganization of utility properties recently added to the Southern Cities Utilties Company system. As evidence be quoted the earnings of the Southern Utilities system. Consolidated gross revenues of the company and its subsidiaries, including the new Spanish properties, for the year ended June 30, 1929, amounted to $5,329,562, an increase of $1,147,867, or about 21 per cent, as compared with the system's gross revenue for the year 1928. Net earnings for the same periods show an increase of $543,112, or 24 per cent, over the figures as of December 31, 1928. On that date net earnings amounted to $1,715,998, while the total as of June 30, 1929, was $2,259,110.

Brokers' Loans and the Utility Market

DURING the past week almost a score of public utility stocks listed on the New York Stock Exchange alone registered new highs for the year. This, following so closely upon the increase in the rediscount rate of the Federal Reserve Bank of New York, and accompanied, incidentally, by a rise of $133,000,000 in brokers' loans, suggests the lack of any concern on the part of buyers of utility stocks in interest paid on their loans.

Utility stocks, it is generally recognized, are more or less in a special class, being affected by the consolidation movement in the industry. Competitive buying in search of control of certain situations has led to artificial prices, in many cases, and this has been accelerated by the rushing in of the public and the investment trusts where the floating supply has been definitely limited. At the same time the utilities, as a branch of the general market, have the same relation to brokers' loan totals as have other groups. The fact that loans last week reached a new high of $6,085,000,000, which represented a 45 per cent growth in a year, helps to explain the high prices quoted for many of the stocks.

An interesting phase of recent brokers' loan statements is the large volume of funds loaned by "others." This total is now close to $3,500,000,000 and is steadily expanding. It is thus explained in a recent statement issued by Pynchon & Company:

These loans for the account of others are derived chiefly from four sources—investment trusts, corporation funds, foreign balances here awaiting investment, individuals or associations. Most investment trusts maintain a fluid surplus of large proportions with which to take advantage of investment opportunities, and these trusts, as a group, are probably the largest lenders in the call money market. Loans by corporations in the call market have been very large during the last year, and the tendency to employ this vehicle as a means of keeping funds at work seems to be growing. This development is a comparatively new one in finance, for it was not until about two years ago, when the cash account of many large corporations began to swell, that the item "assets in cash or call loans" began to appear extensively in balance sheets.

Large sums have been supplied to the call money market by foreign interests as well. It has been the policy of prospective purchasers of commodities and goods in the American market to assemble their funds and loan them until needed. This policy has been followed chiefly by foreign buyers of wheat and cotton.

With the sources of capital apparently unlimited, it is not surprising that the

upward movement continues in market prices, nor will there be any change until these "others" decide that the top has been reached and that they should turn their attention elsewhere.

ELECTRICAL PRODUCTION CORPORATION STOCK ADMITTED TO TRADING.—Electrical Production Corporation of Washington, Seattle, common stock has been admitted to trading on the Seattle Stock Exchange. The corporation is one of the associated Claude Neon companies and holds the franchise covering manufacturing and sale of Neon tubing in Washington, Idaho and Montana. The company has retired its serial gold note and preferred stock issues. It has 100,000 shares of common stock authorized, outstanding and listed. Dividends of $1 per share were paid on common stock June 15.

ATLANTIC PUBLIC UTILITIES ISSUES BONDS.—Secured convertible one-year gold bonds, series A, of the Atlantic Public Utilities, Inc., were offered the investing public during the past week at 99 and interest to yield over 7 per cent, a piece of financing involving a total of $1,500,000. Proceeds of these securities will be used to refund maturing obligations, to reimburse the company for additions and betterments made to its properties and for other corporate purposes. These bonds are convertible into class A shares at any time prior to maturity or, in case of redemption, at any time prior to the redemption date, on the basis of 35 shares of class A per $1,000 bond, with adjustment of accrued interest and dividend.

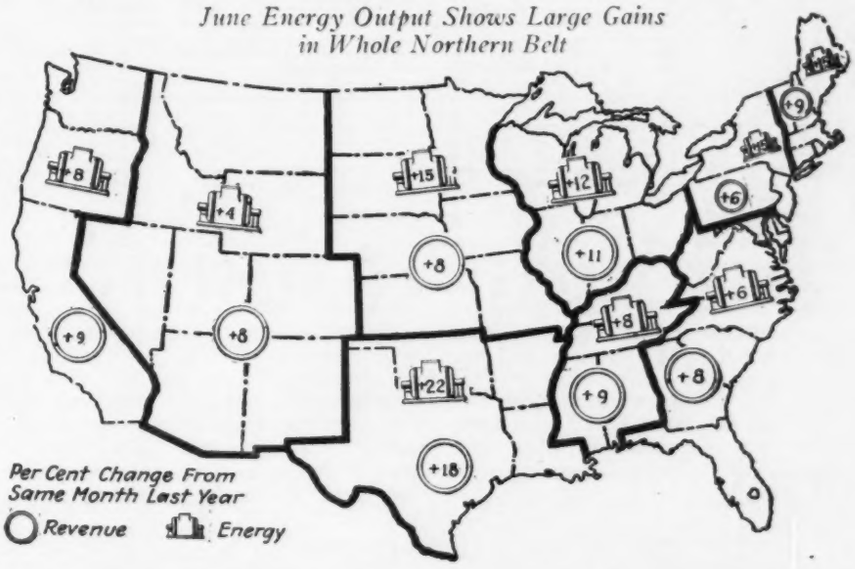
INTERNATIONAL HYDRO-ELECTRIC OUTPUT UP.—The International Hydro-Electric System, a division of the International Paper & Power Company, produced 297,459,000 kw.-hr. of electric energy in July, an increase of 51 per cent over July, 1928. In the first seven months of this year the output of the International Hydro-Electric System was 2,140,974,000 kw.-hr., an increase of 54 per cent over the corresponding period of 1928. The production of the system in the twelve months ended July 31 was 3,423,581,000 kw.-hr., an increase of 52 per cent over that of the twelve months ended July 31, 1928.

Half-Year's Revenue Exceeds Billion Dollars

Overshoots 1928 by 8.7 per Cent. June Earnings $162,500,000. Scarcity of Water Loads Steam Plants

WITH a total of $162,500,000, June revenues of the electric light and power industry as computed for the entire country from reports received by the ELECTRICAL WORLD exceeded those of the corresponding month last year by 8.7 per cent. The same percentage applies to the growth in earnings for the half year, which for the first time in the history of the industry passed the billion-dollar mark. The amount for the six months was $1,022,400,000. Operating expenses, respectively $70,100,000 and $421,400,000, increased by a slightly smaller percentage than revenue. Comparative figures for each month are shown in Table I. In the last two months the earnings exceeded the computed normal, which for June would have been $159,000,000.

June Energy Output Shows Large Gains in Whole Northern Belt



Energy output in June was 7,407,127,000 kw.-hr., and for the half-year 45,075,681,000 kw.-hr. The former is 11.6 per cent larger than in 1928, the latter 13.5 per cent. The moderate seasonal decline from the May output, shown in Table III, is normal; the growth continues well in excess of what might have been anticipated from past records. In connection with the slight decrease in the average daily output from that of May it should be noted that June this year had five Saturdays and five Sundays. The continued large gains, compared with 1928, clearly reflect the current industrial activity, together with an increasing use of electric drive, and there is evidence that this strong upward trend applies to residential consumption also.

LARGE INCREASE IN STEAM

Scarcity of water is indicated by the decrease in hydro energy from 44 per cent of the total in May to 40 per cent in June, when the output from this source was actually less than it was a year ago. Consequently about 800,000,-

Table I—Central-Station Financial Operations in the United States

Compared with Corresponding Month of Previous Year

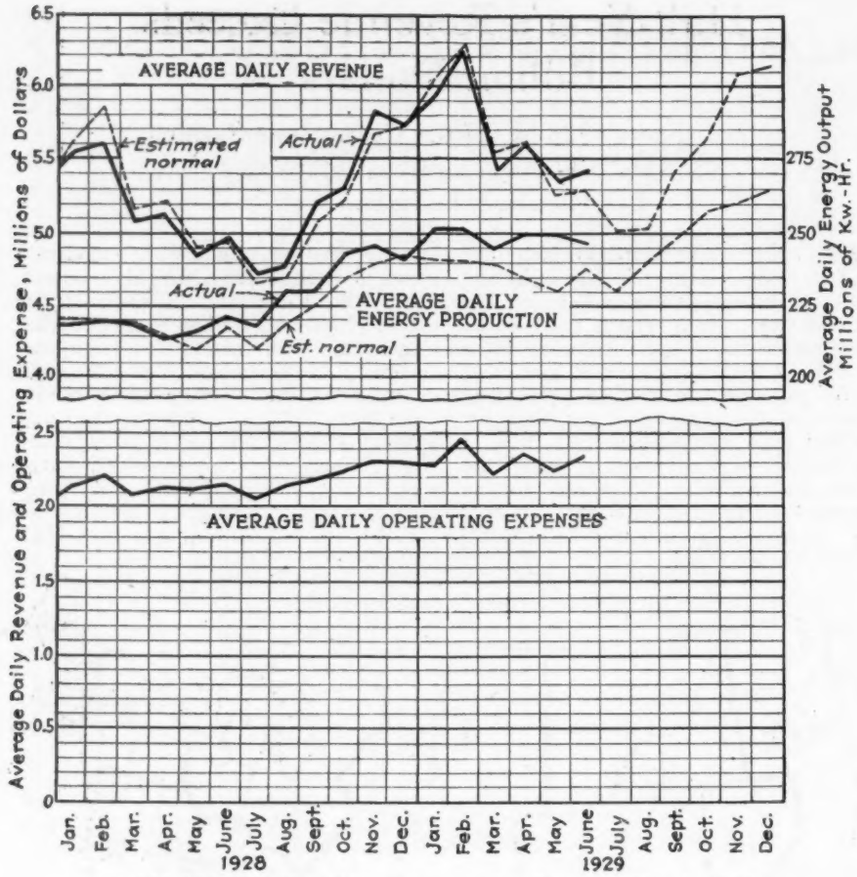
Month	Total Gross Revenue from Sale of Energy*			Total Operating and Maintenance Expense†		
	1929 Thousands	1928 Thousands	Per Cent Inc.	1929 Thousands	1928 Thousands	Per Cent Inc.
January	$184,200	$170,000	+8.2	$71,900	$66,700	+7.8
February	174,300	161,300	+8.0	69,100	64,200	+7.5
March	167,700	155,700	+7.6	69,100	64,700	+6.8
April	168,100	153,800	+9.4	70,400	64,100	+9.9
May	165,600	150,100	+10.3	70,800	65,700	+8.0
June	162,500	149,500	+8.7	70,100	64,800	+8.2
Half year	$1,022,400	$940,400	+8.7	$421,400	$390,200	+8.0

Table II—Central-Station Fuel Consumption in the United States‡

Compared with Corresponding Month of Previous Year

Month 1929	Coal		Oil		Gas	
	Short Tons	Per Cent Increase	Barrels	Per Cent Increase	Thousands Cubic Feet	Per Cent Increase
January	3,796,788	+14.3	909,085	+62.0	7,923,161	+60.0
February	3,381,668	+ 8.3	834,386	+60.0	7,164,889	+46.4
March	3,266,895	+ 4.7	707,446	+21.1	8,101,167	+44.6
April	3,134,744	+11.7	613,207	+21.0	7,805,763	+47.2
May	3,095,001	+ 9.8	566,876	+22.8	8,514,389	+48.6
June	3,132,502	+14.1	586,519	+22.9	8,746,588	+40.6
Half year	19,807,598	+10.3	4,217,519	+35.0	48,255,957	+47.8

*Aggregate gross revenue from consumers and from other utilities for energy for resale, involving a certain amount of duplication.
†Do not include interest, taxes, depreciation or sinking fund, with some unavoidable exceptions. ‡As collected by U. S. Geological Survey.



5,000,000,000 Kw.-Hr. Increase in First Half of 1929

000 kw.-hr., or 21.7 per cent, more had to be developed from fuel. The same situation has prevailed more or less throughout the spring, as Table III indicates; 19 per cent more energy was produced from fuel than last year and only 6 per cent more from water power, during the entire period. Expressed in actual units, this additional production from fuel runs into large figures; the increase is more than 4,000,000,000 kw.-hr.

The consumption of coal, oil and natural gas underwent a corresponding increase: 14.1 per cent for the first-named, rising to 3,132,502 short tons, nearly 23 per cent for the second and over 40 per cent for the third. The changes during the half-year can be traced in Table II. The use of oil is growing, though it is by no means what it was four or five years ago. Gas is increasing rapidly as new power developments are made in the territory where it is available. The two together are now equivalent to a sixth of the coal burned.

Regionally the increase in revenue has been remarkably uniform, as appears from Table IV and the map. The West South Central states continue to stand out, with a gain of 17.7 per cent, and the East North Central report 10.7. In growth of output the West South Central region leads, with 22 per cent; the northern and eastern parts of the country are somewhat above the country's average, the West below.

The lack of water previously mentioned is especially manifest in the East. New England's hydro output was 15 per cent lower than in June of 1928, and in the Middle Atlantic states the decrease approached 7 per cent. These losses were not quite off-set by gains in the Mississippi Valley. Steam, therefore, shows country-wide gains, rising to 47.5 per cent in New England and almost doubling on the Coast.

Table III—Energy Output of Central Stations in the United States

Compared with Corresponding Month of Previous Year

Month 1929	Generated, Thousands of Kw.-Hr.*						Purchased for Resale	
	Total		Hydro		Fuel			
	Generated	Per Cent Inc.	Generated	Per Cent Inc.	Generated	Per Cent Inc.	Thous. Kw.-Hr.	Per Cent Inc.
January	7,803,765	+15.2	2,625,408	+ 0.6	5,178,357	+24.5	1,260,000	0
February	7,046,042	+10.0	2,390,320	— 2.9	4,655,722	+18.1	1,200,000	0
March	7,606,649	+12.4	3,090,276	+12.8	4,516,373	+12.0	1,340,000	+ 5.0
April	7,506,484	+16.9	3,210,363	+13.4	4,296,121	+19.5	1,385,000	+14.0
May	7,705,614	+14.6	3,395,145	+10.5	4,310,467	+18.0	1,420,000	+13.0
June	7,407,127	+11.6	2,990,548	— 0.6	4,416,579	+21.7	1,335,000	+ 8.0
Half year	45,075,681	+13.5	17,702,060	+ 6.0	27,373,619	+19.0	7,940,000	+ 5.0

Table IV—Regional Operations, Revenue and Energy Output in June, 1929

Compared with Corresponding Month of Previous Year

Region	Revenue		Energy Generated, Thousands of Kw.-Hr.*					
			Total		Hydro		Fuel	
	Thousands of Dollars	Per Cent Inc.	Generated	Per Cent Inc.	Generated	Per Cent Inc.	Generated	Per Cent Inc.
United States	165,200	+ 8.7	7,407,127	+11.6	2,990,548	— 0.6	4,416,579	+21.7
New England	15,390	+ 8.8	463,246	+14.8	177,193	—15.5	286,053	+47.5
Middle Atlantic	40,800	+ 6.1	1,739,649	+14.6	514,758	— 6.7	1,224,891	+26.8
East North Central	41,600	+10.7	1,791,412	+12.4	226,002	+ 7.9	1,565,410	+13.1
West North Central	12,870	+ 7.9	440,330	+15.5	151,520	+17.0	288,810	+14.9
South Atlantic	17,320	+ 7.7	936,073	+ 5.7	549,409	+ 2.4	386,664	+10.9
East South Central	5,760	+ 8.8	272,994	+ 7.8	221,585	+ 6.2	51,409	+15.4
West South Central	8,770	+17.7	394,106	+22.0	6,062	— 9.2	388,044	+22.6
Mountain	4,220	+ 7.5	331,741	+ 4.3	289,886	+ 0.6	41,855	+40.0
Pacific	15,770	+ 8.8	1,037,576	+ 7.8	854,133	— 1.8	183,443	+99.2

*As collected by U. S. Geological Survey.

BOSTON EDISON STOCKHOLDERS APPROVE STOCK SPLIT-UP.—Stockholders of the Edison Electric Illuminating Company of Boston at a special meeting approved issuance of four shares (par $25) for each present share, having a par value of $100. This change in capitalization is subject to the approval of the Department of Public Utilities.

WINNIPEG ELECTRIC REPORTS INCREASED EARNINGS.—Current earnings of the Winnipeg Electric Company for the first half of this year show a substantial advance. Gross earnings for the six months totaled $3,347,448. This compares with $3,118,678 in the first half of 1928. Operating expenses also show an increase, though the percentage increase is not as great as in the case of earnings, having amounted to $2,343,826 this year, compared with $2,279,800 for the half year period last year. Accordingly net operating income for the six months ended June this year advanced to $1,004,622, as against $838,800 reported as the half year mark in 1928.

INTERNATIONAL SUPERPOWER OFFERS RIGHTS.—Directors of the International Superpower Corporation have authorized an offering of rights to stockholders to purchase one share of new stock for each four shares now held at $75 per share. A special meeting of stockholders will be called September 20 to approve the financing.

Business News and Market Conditions

High Manufacturing Operations Maintained

REPORTS received by the ELECTRICAL WORLD from a large proportion of the electrical manufacturing plants of the country indicate that near-record productive activity was maintained during July. The July rate of operations was exceeded only by that reported for the previous June.

Rate of operations during July was only 2.3 per cent under June, the record month for the industry, but was 38 per cent over July last year. It appears that the peak of activity for 1929 was reached in June, although if the trend of past years is maintained a still higher rate of operations may be recorded during October or November.

July, 1929	166.6
June, 1929	170.5
May, 1929	163.5
April, 1929	154.6
July, 1928	120.8
Average first seven months 1929	155.2
Average first seven months 1928	121.4

The reports on electrical energy consumption indicate that the smaller electrical manufacturing plants are maintaining their productive operations in a better position than the group of larger companies. The smaller companies recorded an average increase in operations of 0.2 per cent as compared with June and 38.5 per cent as compared with July last year. The larger plants reported a decrease of 7.2 per cent as compared with June, but an increase of 37 per cent as compared with July last year.

The index of activity in the electrical manufacturing industry, based on consumption of electrical energy, stands at 166.6 for July as compared with 120.8 in July last year. Comparative indexes of productive activity referred to the average activity for the period 1923-25 as 100 and adjusted for number of working days are as shown in the accompanying table.

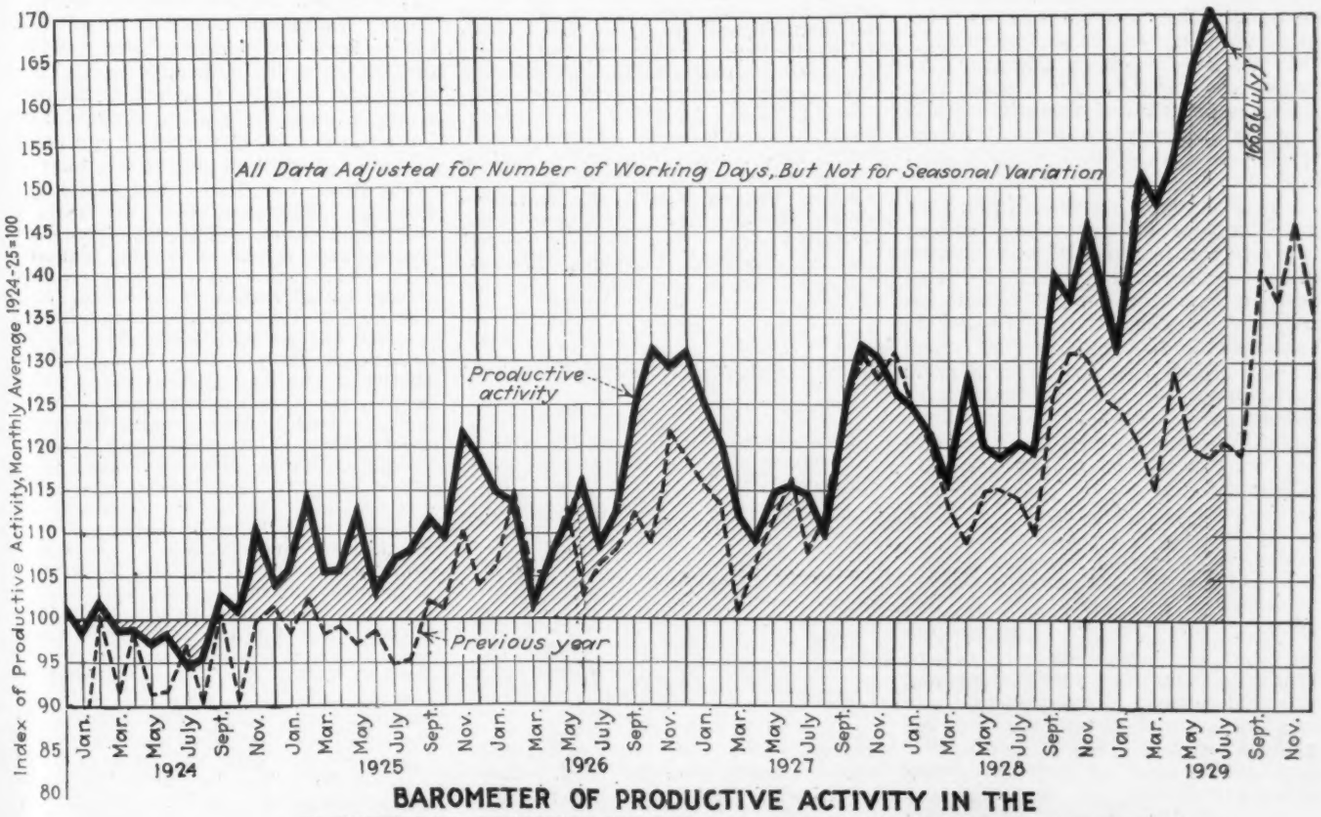
Active Demand for Copper and Lead

Consumers entered the market for both copper and lead on a large scale, the week's business being greater in volume than for any similar period since early March. Demand for zinc, while not active, registered some improvement over that which obtained last week. Tin was quiet. Prices, with the exception of tin, held on a firm basis. A feature in the situation was the tendency on the part of consumers to take on metal for shipment a little beyond immediate needs, indicating that they have more confidence in the general situation. Quite a little October copper and lead was placed during the week.

The volume of business booked in copper was the largest for any week since early March, the quantity sold for domestic account being close to 28,000 tons. The fact that all sellers did not share proportionately in transactions for the week gave the market a more or less spotty appearance. An encouraging development was the increased demand for copper for shipment two months or so ahead, almost 30 per cent of the sales being for October shipment. A moderate tonnage was sold for November shipment. All of the business was placed on the basis of 18 cents per pound for delivery in Connecticut Valley.

NEW YORK METAL MARKET PRICES

	Aug. 21, 1929 Cents per Pound	Aug. 28, 1929 Cents per Pound
Copper, electrolytic	18	18
Lead, Am. S. & R. price	6.75	6.75
Antimony	9.87	9.00
Nickel, ingot	35	35
Zinc, spot	7.15	7.15
Tin, Straits	46.35	46.00
Aluminum, 99 per cent.	24.30	24.30



BAROMETER OF PRODUCTIVE ACTIVITY IN THE ELECTRICAL MANUFACTURING PLANTS OF THE UNITED STATES

Market Conditions

WITH the midsummer lull in electrical equipment business over indications of increasing demand accumulate. The equipment producers report business very satisfactory and look for better. The Eastern district reports heavy equipment moving more actively with a sizable order for a turbo-generator unit.

——IN THE SOUTHEAST A POWER TRANSFORMER ORDER heads the list, with the general trend in the right direction.

——NEW ENGLAND REPORTS FURTHER PROGRESS in specialty business, such as aviation requirements.

——HEAVY EQUIPMENT BUSINESS SHOWS REVIVAL on the Pacific Coast with transformers, meters and oil circuit breakers on the lists.

PACIFIC COAST

POWER company business for the Pacific Coast is reported particularly good for the past week in distribution transformers, motors, meters and oil circuit breakers. Jobbers report business fair, but slightly below last year, which itself was only fair. Radio business is expected to show greater activity as a result of the San Francisco Radio Show, which closed last week. Wire companies and jobbers alike report power company business as most active

Westinghouse reports four outstanding orders, one valued at $150,000 for three locomotives, 76 tons each, for a Chile copper company and one for a southern California oil company for synchronous motors amounting to $18,000. A northwest lumber company purchased two storage battery locomotives valued at $15,000 and a northwest municipality ordered two vertical waterwheel generators, 2,500 kva. each, costing $40,000.

Industrial buying continues light, with indications for heavier volume during the early fall months. Central station sales were better last week. Sales of apparatus, motor and wire reported include: Approximately $5,000 worth of disconnecting switches, $12,000 worth of oil circuit breakers and $18,000 worth of transformers to the Northwestern Electric Company for a substation at Vancouver; $18,000 worth of disconnecting switches for Tacoma's Lake Cushman hydro-electric plant. Motor sales included ten to dealers ranging from 5 hp. down; two 75s and several smaller motors for a sawmill; several from 10 hp. down to a power company; four 1,000-gal. fire pumps, including two 100-hp. motors; one 120-hp. steam turbine, one gas engine and ten motors from 2 hp. down for woodworking and industrial plants. The Westinghouse company secured a contract for ten passenger elevators, motors and control apparatus for a county and city building addition in Seattle, the award approximating $200,000. Bids were received from the Willamette Iron Works of Portland ranging from $58,500 to $71,900 for furnishing tainter hoists and gates for the city of Seattle's Diablo dam in connection with the Skagit hydro-electric project. Construction projects follow:

The Pacific Electric Railway Company, Los Angeles, Calif., will build a one-story power substation at Los Nietos, reported to cost $45,000. The Preston School of Industry, Ione, Calif., is having plans drawn for electric power plant for service at the institution. The Southern Pacific Railroad Company, Los Angeles, Calif., has approved plans for locomotive repair shops, near city limits, to cost $250,000. The Board of County Supervisors, Los Angeles, will receive bids until Sept. 10, for one 300 kva. generator set for the Los Angeles General Hospital. The Yorba Linda Citrus Association, Yorba Linda, Calif., plans packing plant to cost $100,000. Sacramento, Berkeley, Ventura, Los Angeles, Santa Rosa and Monterey, Calif., plan ornamental lighting systems. The Crown-Willamette Paper Company, Camas, Wash., has plans for new addition in connection with expansion and improvement program to cost $2,500,000. Ellensburg, Wash., plans ornamental lighting system. Butte, Mont., plans ornamental lighting system. Cheyenne, Wyo., plans installation of airport lighting system, including beacon lamps. Tucson, Ariz., plans ornamental lighting system. The Phoenix Central Produce Terminal Company, Phoenix, Ariz., plans produce terminal with cold storage facilities to cost $120,000.

NEW ENGLAND

SALES of electric specialties are of interest in New England and aviation field needs are active. Recently an interesting order consisting of border lights was placed, and installation of a number of electric guide beacons was recorded. Merchandising is steady and refrigerator sales are gaining. Reports indicate that August sales will exceed the volume of last month. No large orders are recorded but the trend is steady.

Motor sales are active; last week orders reached a normal level, amounting to over $35,000. Heavy industrial electrical machinery orders have dropped off. On the other hand, one manufacturer reports two waterwheel generator sales, one of horizontal type, 750 kv. Switch and control equipment orders are fairly steady. Complete switchboard layouts have received some attention and several orders were reported, one amounting to about $9,000 and another of $7,500. Central station apparatus is quiet; last week two small orders for northern New England substations, one of which was for $4,000 worth of control equipment, were noted. Scheduled materials are moving well. New construction materials are active due to a number of large wiring contracts. One totaling about $50,000 was noted. A number of state contracts involving wiring for power and light are pending.

MIDDLE WEST

BUSINESS in the Middle West is picking up the slight momentum lost during the usual slowing up consequent upon vacations, hot weather and summer inventory periods. Industrial productions are getting into strides anticipatory of fall trade. Preliminary estimates of agricultural production now being made indicate an approximate parity with the 1928 level. Retail trade is in general slightly higher than at this period last year and in the specific case of electrical merchandise is definitely above 1928.

Utility construction programs, now well along toward completion, show no indication of slowing from schedules. Manufacturers of power plant and the larger system equipments report a satisfactory volume of business, as do also the makers of specialties and smaller devices. In the Chicago region the activities of the building trades, normal to this time of the year, are reflected in large movements of wiring supplies and material. Construction projects follow:

The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., will build a machine shop to cost $100,000. The Wisconsin Power & Light Company, Madison, Wis., plans extensions and improvements in distributing system at Randolph, Wis. The Ford Motor Company, Detroit, Mich., is completing plans for power plant at airport at Dearborn, Mich., to cost about $125,000. The Detroit Edison Company, Detroit, Mich., contemplates power substation at Monroe, Mich., reported to cost about $50,000. The Detroit Steel Products Company, Detroit, Mich., will build plant for manufacture of automobile springs to cost $800,000. The Wayne County Board of Supervisors, Detroit, Mich., will soon take bids for power plant at municipal airport, reported to cost $100,000. Wyandotte, Mich., contemplates a municipal electric light and power plant to cost more than $70,000. The Chicago Steel Tank Company, Chicago, Ill., plans addition to cost about $100,000. The Temple Corporation, Chicago, Ill., plans plant for exclusive production of electric-operated radios to cost $500,000. The Western Clock Company, Peru, Ill., plans addition to plant to cost $180,000. The Burton-Dixie Corporation, Chicago, Ill., plans mattress factory at Memphis, Tenn., to cost $200,000. The Mid-States Steel & Wire Company, Craw-

fordsville, Ind., plans addition to cost about $70,000. The Interstate Public Service Company, Indianapolis, Ind., has acquired nine rural electric properties in Marshall County, and plans extensions in transmission lines in that district. The Eagle Engineering Company, Springfield, Ohio, plans addition to machinery manufacturing plant, reported to cost $85,000. The Mineral Felt Insulating Company, Toledo, Ohio, contemplates rebuilding of portion of plant recently destroyed by fire with loss of $70,000. The Central Ohio Paper Company, Columbus, Ohio, plans storage and distributing plant to cost $120,000.

SOUTHWEST

BUYING by central stations has been in good volume in the St. Louis district. Line construction material is still in good demand. The weak spot noted in the past ten days is in building materials. Jobbers report general business keeping up to previous statements.

An order aggregating $54,000 was placed for thirteen oil circuit breakers to be installed in the substation bringing Keokuk power into St. Louis. Contracts closed for circuit breakers amounting to $23,000 and current-limiting reactors to cost $10,000 are for a substation in southeast Missouri lead district. One of the St. Louis newspapers bought five sets of double-motor press-driving equipment amounting to $40,000. An order for a miscellaneous lot of motors of from 5 to 25 hp. was placed by an industrial concern. Construction projects follow:

The Mississippi Glass Company, St. Louis, Mo., plans addition to cost more than $100,000. The Laclede Steel Company, St. Louis, Mo., plans pipe manufacturing plant at Alton, Ill., to cost $175,000. The Multiplex Display Fixture Company, St. Louis, Mo., plans addition to cost $65,000. Kansas City Power & Light Company, Kansas City, Mo., has plans for power substation, reported to cost $45,000. The Home Produce Company, Butler, Mo., plans rebuilding of ice-manufacturing plant, recently destroyed by fire with loss reported in excess of $35,000. Springfield, Mo., will install airport lighting system, including beacon lamps. Nowata, Okla., contemplates municipal electric light and power plant to cost $40,000. Woodward, Okla., plans installation of floodlighting system and beacon lamps at proposed municipal airport to cost $85,000. The Anderson-Tully Company, Stuart, Ark., plans rebuilding of lumber plant, recently destroyed by fire with loss of close to $95,000. Russellville, Ark., plans early call for bids for municipal electric light and power plant and system to cost $240,000. The Southwestern Gas & Electric Company, Shreveport, La., plans ornamental lighting system at Siloam Springs, Ark. El Paso, Tex., will soon take bids for an electric-operated traffic control system. The Gulf States Utilities Company, Beaumont, Tex., contemplates extensions in transmission line to Hankamer and vicinity, about 12 miles. The Humble Oil & Refining Company, Houston, Tex., plans electric power plant at Ingleside oil refinery, reported to cost more than $100,000. The Galveston Wharf Company, Galveston, Tex., has filed plans for a grain elevator to cost $1,500,000.

EASTERN

WITH the advent of the fall season at hand, business continues an upward trend in the Eastern district, and three important buying factors—central stations, industrials and railways—are placing commitments of record proportions for this time of year. The outlook for the next 60 to 90 days is encouraging. Incoming inquiries are well distributed over a wide range of equipment and the increasing volume of early future account justifies the optimism expressed by the large majority of leading manufacturers in this section.

Two notable awards have been placed during the past week. The New York Edison Company has contracted with the Westinghouse Electric & Manufacturing Company for a 110,000-kw. turbo-generator unit for the Hudson Avenue station of the Brooklyn Edison Company; the order for four watertube boilers, equipped with automatic stokers, has been placed with the Babcock & Wilcox Company, and contracts for accessory equipment will be given at an early date. The complete installation is estimated to cost $7,000,000. The Delaware, Lackawanna & Western Railroad Company has ordered initial car equipment for its suburban line electrification program in New Jersey; the General Electric Company has received a contract for motors and control apparatus, each with rating of 230 hp., for 141 all-steel electric vestibuled coaches to be built by the Pullman Car & Manufacturing Company, Chicago, the entire commitment approximating $4,000,000.

According to a leading maker of mill motors, there is heavy business ahead for direct-current units, and this type of equipment is expressed as "staging a come-back." A producer of Diesel engines in Pennsylvania has received the largest single order in the history of the company, covering fifteen complete units to cost close to $400,000, to be used for marine service. Construction projects follow:

The American Can Company, New York, plans additions to plant at Newark, N. J., to cost $150,000, and is considering erection of branch plant at Simcoe, Ont., to cost more than $400,000. The Consolidated Aircraft Corporation, Buffalo, N. Y., contemplates manufacturing plant at Long Beach, Calif., to cost in excess of $350,000. The Trico Products Corporation, Buffalo, N. Y., plans automobile accessory manufacturing plant at Bridgeburg, Ont., reported to cost $100,000. The Hickey-Freeman Company, Rochester, N. Y., will build addition to clothing factory to cost close to $100,000. The Pennsylvania Dock & Warehouse Company, affiliated with the Pennsylvania Railroad Company, New York, will build a cold storage and refrigerating plant and dry storage warehouse at Jersey City, N. J., to cost more than $4,000,000. The Sterling Engine Company, Buffalo, N. Y., plans addition reported to cost close to $80,000. The Excelsior Pearl Works, Inc., Brooklyn, N. Y., plans plant at Federalsburg, Md., to cost about $75,000. The Knickerbocker Ice Company, New York, has taken out a permit for an ice-manufacturing plant to cost $200,000.

The American Cigar Company, Philadelphia, Pa., has filed plans for a plant to cost $150,000. The Quaker City Laundry Company, Philadelphia, has approved plans for a power plant. The Glen Alden Coal Company, Scranton, Pa., will make extensions and improvements in its Diamond Colliery, near Hazleton, Pa., and will electrify the property. The Pennsylvania Power & Light Company, Allentown, Pa., has organized seven transmission companies to install and operate lines in different townships in Clinton County. The Consolidated Gas, Electric Light & Power Company, Baltimore, Md., has filed plans for an equipment storage and distributing plant to cost $170,000. The General Purchasing Officer, Panama Canal, Washington, D. C., will receive bids until September 4 for 13,325 lb. of copper wire, cable clips, electric refrigerators, etc. (Panama Schedule No. 1985.)

SOUTHEAST

VOLUME of electrical business in the southeast is reported satisfactory, though it is composed mainly of small-sized orders. Little activity was reported from industrials, but central station buying continues around average.

The largest order placed last week was for power transformers amounting to something over $100,000, and the same company ordered oil circuit breaker equipment totaling $70,000. Another company ordered disconnecting switches costing approximately $10,000 to go into a new steam station under construction. One company's creosoted pine pole and pole line equipment orders last week amounted to $12,000 and its purchases of wire totaled $9,000. Some other wire orders were for three cars of weatherproof copper and two cars of bare copper, the latter order coming from a large municipal plant in the section. Other central station orders reported were for voltage regulators amounting to $8,600 and small disconnect switches totaling $3,400. One industrial rewiring project was responsible for an order for $5,000 worth of wiring supplies. Some contractor orders were for $3,000 worth of house wiring materials for a mill village job, $2,000 worth of industrial wiring materials and $1,500 worth of lighting fixtures and wiring supplies for a school job. Construction projects follow:

Charleston, W. Va., plans installation of floodlighting system and beacon lamps at proposed municipal airport, project to cost $75,000. The Fokker Aircraft Corporation of America, Inc., Glendale, W. Va., is reported planning branch plants at San Francisco, Calif., and at Dayton, Ohio, to cost more than $250,000. The Tennessee Eastman Corporation, Kingsport, Tenn., has approved plans for power plant to cost $150,000. The Greenville Compress Company, Greenville, Miss., will build cotton compress plant to cost $100,000. Kosciusko, Miss., plans ornamental lighting system. The Coastal Public Service Company, Guyton, Ga., plans extensions and improvements in power plant, including installation of generator, engine and accessories.

Activities of the Trade

Hoover Conventions to Be More Frequent

Departing from its custom of holding one annual sales convention at Hoover Camp, near the company's factory at North Canton, Ohio, the Hoover Company is this year holding thirteen sectional conventions in the field. In the past only the upper 10 per cent of the sales force from a production standpoint were privileged to attend, whereas the new plan brings in for the sectional conventions all those engaged in Hoover sales and service work, thus extending to the many the benefits that were largely limited to the few.

The sectional conventions are to be held almost without exception in branch headquarters cities, and in two instances two branches combine their conventions. The first convention of the Western area convenes in Minneapolis, August 28, and the first in the Eastern area in Detroit, September 3.

British Electrical Merger

British Thomson-Houston products are hereafter to be marketed by Edison Swan, in respect of wiring supplies, lighting, engineering, electric refrigeration and radio business. The one exception, apparently, to the sale of the British Thomson-Houston products is in regard to "Mazda" lamps, which will be marketed by the lamp sales department of the B.T.H. Company. As a development in the merchandising side of the British electrical industry, the step is of considerable interest. When toward the end of 1928 controlling interests were acquired by what is now the Associated Electrical Industries in both the British Thomson-Houston and the Edison Swan Electric Companies it was inevitable that some such step as has now been decided upon should come into effect.

THE LEWIS-SHEPARD COMPANY of 125 Walnut Street, Watertown Station, Boston, Mass., announces the appointment of Fred A. Conkle as railroad representative for the sale of its lift trucks, stackers, skid platforms and racks to the railroad field in the United States. Mr. Conkle was previously associated with the New England Road Machinery Company. His office will be at the Boston address for the present.

CURTIS LIGHTING OF NEW YORK, INC., New York City, announces the appointment of Harvey B. Wheeler of Kansas City as sales manager. Mr. Wheeler is well known in the lighting field, having been associated with Curtis Lighting, Inc., for twenty years in engineering and sales work. The New York company, of which L. H. Graves is vice-president and general manager and H. R. Eldredge secretary and treasurer, has recently opened new offices and show rooms in the New York Central Building, 230 Park Avenue.

THE TIME-O-STAT CONTROL COMPANY, Elkhart, Ind., has recently occupied a new plant, with a force of 350 persons, which has since been augmented to 500. The plant has 67,000 sq.ft. of floor space and an addition of 3,000 more square feet for general production purposes will shortly be completed. The Time-O-Stat Control Company manufactures heat controls for various industrial and household uses.

THE WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY was recently awarded an order by the city of Springfield, Ill., for a complete automatic reclosing substation. All of the switchboard equipment will be mounted on modern stretcher level steel panels, which will be mounted near the wall of the station. The switching equipment will control two transformer panels and four automatic reclosing feeder equipments with type GR reclosing relays.

Plan to Split Allis-Chalmers Stock

A proposal has been made to split the common stock of the Allis-Chalmers Manufacturing Company four for one. A special meeting of the stockholders has been called for September 20 for the purpose of voting on an increase in the amount of authorized common stock from 500,000 to 2,000,000 shares, so that in place of the 286,000 shares now outstanding there will be 1,144,000.

Domestic Electric Company Acquires Property

Announcement has just been made by Carl A. Duffner, president of the Domestic Electric Company, Cleveland, Ohio, that that company has just consummated the purchase of a group of buildings and a tract of land at Kent, Ohio, to be devoted solely to the manufacture of fractional-horsepower motors of the universal type.

The group of buildings comprises office space and factory buildings and will more than double the capacity of the present Domestic Electric Company plant in Cleveland. This company is a division of Black & Decker, Towson, Md.

General Electric Distributing Units Are Consolidated

ANNOUNCEMENT has been made by the General Electric Company that, effective October 1, 1929, the fourteen wholesale distributing corporations owned by that company will be consolidated into the General Electric Supply Corporation (of Delaware).

These companies have for many years distributed General Electric products and the plan involves no change of ownership. The consolidated corporation will be in a much better position to offer nationwide service through its ability to give service from any one of 76 houses, through interchangeability of stocks, and speedier and more economical operation.

According to tentative plans announced last week, the officers of the new corporation will comprise Gerard Swope, chairman of the board; C. E. Patterson, president; J. L. Buchanan, executive vice-president; J. G. Johannesen, vice-president of the Eastern region, and D. E. Harris, vice-president of the Western region. Apart from Mr. Swope and Mr. Patterson, several of the other directors of the new corporation have been associated with certain of the leading distributing corporations in the group. C. E. Patterson, vice-president of the General Electric Company, has charge of all merchandising activities, including the supervision of company supply houses. Mr. Buchanan is president of the Wesco Supply Company. J. G. Johannesen is manager of the Southern Electric Company of Baltimore and more recently president of the Sibley-Pitman Electric Corporation of New York City. Mr. Johannesen has been prominent in the affairs of the Supply and Salvage Association and is well known in the electrical industry. D. E. Harris has been president of the Pacific States Electric Company of San Francisco.

In addition to the officers referred to the board of directors includes: N. R. Birge, A. D. Cameron, H. C. Houck, J. E. Kewley, G. C. Osborn, T. K. Quinn, E. O. Shreve and C. E. Wilson. L. R. Link is secretary-treasurer and L. M. Nichols is comptroller.

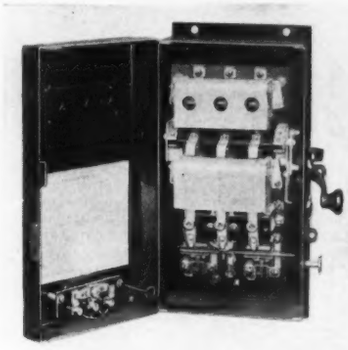
THE SYNTHANE CORPORATION, manufacturer of laminated Bakelite products, Oaks, Pa., announces that J. K. Johnson is now Philadelphia district sales representative for the company. Other representatives are J. B. Rittenhouse, Chicago; H. G. Blauvelt, New York; C. E. White & Company, Cleveland.

New Equipment Available

Starter for Automatic Electric Motor Control

A new combination starter for automatic electric motor control has been placed on the market by the Square D Company. This firm, now in possession of factories at Detroit, Milwaukee, and Peru, Ind., through its recent alliance with the industrial Controller Company of Milwaukee, manufactures a complete line of electrical control equipment.

The new automatic starter is being manufactured in six distinct types. It makes use of across-the-line starters up to 30 hp., 220 volts, and 50 hp., 440 and 550 volts, two or three phase. Each combination starter is a complete unit,



consisting of an across-the-line starter combined with a motor circuit switch, mounted together in one cabinet. The motor circuit switch not only acts as a disconnecting switch but also is capable of opening the circuit while the motor is under load.

It is claimed that a substantial saving in wiring cost is made possible by these new Square D combination starters.

Vapor-Proof "Projectolite"

The Benjamin vapor-proof "Projectolite," manufactured by the Benjamin Electric Manufacturing Company, Des Plaines, Ill., is listed by the Underwriters' Laboratories as a vapor-proof lighting fixture suitable for class I hazardous locations as defined in the National Electrical Code. The "Projectolite," designed for the lighting of horizontal and vertical surfaces from an oblique angle, is recommended for those locations where working operations require an even illumination over an entire surface. This uniformity of illumination has been secured by broadening and flattening the powerful floodlight beam of the "Projectolite" by means of a special lens which directs the greater part of the light to a point farthest from the light source and a correspondingly smaller amount to the points nearer the reflector. The reflector bowl is of chromium-plated copper onto which is swedged a one-piece metal neck. There are no openings in top of the neck to allow dust or vapor seepage, and all wiring is inclosed with leads coming directly from conduit stem through an adjustable, gasket-sealed ball fitting. The unit is sealed at the bottom by a special heat-resisting molded glass lens and double felt gasket held in place by a steel band.

Magnetic Switch with Oil-Immersed Contacts

A new oil-immersed magnetic switch of small capacity is announced by the General Electric Company. This device is particularly suitable for use in gaseous atmospheres such as powder plants, chemical plants or in locations where highly corrosive gases or acids are encountered. It bears the designation CR-7006-V-7.

The new switch has a capacity of 40 amp. and can be used with any motor from 110 to 600 volts, the full load current of which does not exceed this value. The contactor and interlock are standard in design. The overload relay used has oil-immersed contact tips in which the heaters are located above the oil level. The relay is reset from the top of the oil tank.

The inclosing tank is $\frac{1}{4}$-in. sheet metal with a flange for wall mounting. The tank is provided with a felt gasket to prevent the entry of dust.

"New Kathode" Welding Electrode

The "New Kathode" welding electrode is announced by the Lincoln Electric Company of Cleveland, Ohio. It is manufactured for the arc welding of mild steel and for cast iron repair work.

The composition of this product, as well as the special treatment given in its manufacture, imparts special qualities, it is claimed. Flowing easily, with freedom from sputtering, the new electrode produces clean welds with minimum slag and oxidation. The high heat permissible for use with this fast-running electrode makes possible increased welding speed. The quality of the weld is not sacrificed for speed of welding as the new product fuses easily with deep penetration. The resulting weld on steel is soft and readily machinable. This electrode is manufactured in stock lengths of 14 and 24 in.

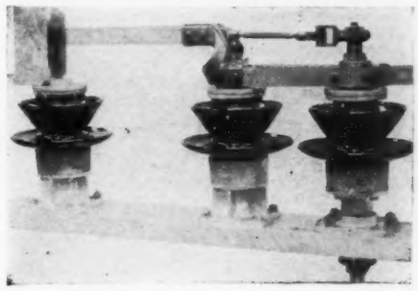
Annealing Furnace Has Accelerated Cooling

A new electric furnace for annealing alloy steel to obtain variable heating and cooling cycles is announced by the General Electric Company. The following advantages are claimed by the manufacturer: Even and efficient heating at variable speeds as may be desired in the process; short or long cooling periods controlled by the operator as desired; fast cooling without expensive honeycomb wall construction and without air in contact with the work, thereby eliminating oxidation or decarburization; a high-grade product with unusual economies per ton of material in a very short time.

The heating units of the new furnace are so distributed that hot spots are avoided and uniform heating results. The furnace walls are insulated in the same manner as those in furnaces operated continuously at higher temperatures.

Heavy-Duty, Gang-Operated Disconnecting Switches

A new heavy-duty line of gang-operated disconnecting switches known as type FMR has been developed by the



Delta-Star Electric Company of Chicago. A single-pole, 15-kv., 600-amp. element for under-hung mounting is shown, the interconnecting mechanism being attached to a ball bearing shaft extending through the channel base. The blade is of reinforced truss type and full floating contacts are equipped with sleet hoods.

Neutral Current Transformers for Residual Relays

A newly designed current transformer for residual relays on grounded neutral systems and designated type OA-1 is announced by the Pacific Electric Manufacturing Corporation of San Francisco, Calif. The purposes of grounding the neutral are, first, to reduce voltage strains on the system and apparatus and, second, to assist in relaying by giving positive and dependable short circuits when one conductor becomes grounded. These current transformers, compared with the usual type, have more iron in the magnetic circuit, more copper in the primary circuit and better bracing. The secondary circuit usually requires a small series resistor to give an over-all impedance of about 2 ohms, in order to give a saturation of the core at a given secondary current and so limit that current to a safe value.

Electrical Patents

Announced by U. S. Patent Office

(Issued August 13, 1929)

1,724,272. MAGNETIC METER MOTOR; E. H. Ford, Wabash, Ind. App. filed Aug. 7, 1926.

1,724,282. MAKING POPPET VALVES; J. H. Hoern, Saginaw, Mich. App. filed Feb. 13, 1928.

1,724,287. BATTERY-WATER-LEVEL INDICATOR; C. E. Krueger, St. Paul, Minn. App. filed Aug. 5, 1927.

1,724,290. ARMATURE OF ELECTRO MOTORS AND GENERATORS; F. W. Lanchester, Moseley, Birmingham, England. App. filed Dec. 17, 1926.

1,724,298. SURFACE LAMP; K. W. Miller, Chicago, Ill. App. filed July 20, 1927.

1,724,307. OUTLET LOCATOR; A. J. Peterson, Chicago, Ill. App. filed March 14, 1925.

1,724,322. ELECTROMECHANICAL RECORDING MECHANISM; E. B. Stephenson, Schenectady, N. Y. App. filed Feb. 13, 1924.

1,724,381. WELDING MACHINE; E. J. von Henke, Chicago, Ill. App. filed Nov. 6, 1926.

1,724,382. SYNCHRONOUS PHASE CONVERTER; K. von Kando, Budapest, Hungary. App. filed April 22, 1925.

1,724,390. DEVICE FOR THE SELECTIVE ISOLATION OF FAULTY ELECTRIC LINE SECTIONS; R. Bauch, Berlin-Charlottenburg, W. Koch, Berlin, R. Volzing, Berlin-Siemensstadt, Germany. App. filed Nov. 4, 1926.

1,724,396. ELECTRIC SWITCH; E. E. F. Creighton, Schenectady, N. Y. App. filed Feb. 21, 1924.

1,724,399. HIGH-FREQUENCY TRANSFORMER; H. F. Elliott, Palo Alto, Cal. App. filed Sept. 17, 1927.

1,724,400. OIL IGNITION; O. A. Fogarty, Cowansville, Que., Can. App. filed July 6, 1926.

1,724,404. SERIES MOTOR-CONTROL SYSTEM; H. D. James, Edgewood, Pa. App. filed Dec. 24, 1927.

1,724,405. COMPENSATING DEVICE; M. Knight, Holyoke, Mass. App. filed Oct. 3, 1925.

1,724,425. THERMOSTAT; F. Schaum, Philadelphia, Pa. App. filed July 2, 1927.

1,724,432. REPEATER COMPASS; E. A. Sperry, Jr., Brooklyn, N. Y. App. filed Dec. 17, 1925.

1,724,437. SYSTEM OF ELECTRIC TRANSMISSION; P. H. Thomas, Upper Montclair, N. J. App. filed Oct. 17, 1925.

1,724,439. THERAPEUTIC APPLIANCE; G. von Hutschler, Hindenburg, Germany. App. filed June 9, 1927.

1,724,446. MAGNETIC MOTOR; H. L. Worthington, San Francisco, Cal. App. filed Nov. 23, 1925.

1,724,499. ELECTRICAL CONDENSER; J. M. Miller, Washington, D. C. App. filed June 3, 1925.

1,724,508. ELECTRICAL APPARATUS FOR CAUTERIZING OR HEATING BODY TISSUES; R. Nauth, Buffalo, N. Y. App. filed Sept. 27, 1927.

1,724,524. ELECTRIC BELL; H. W. Shonnard, Montclair, N. J. App. filed March 28, 1928.

1,724,547. COMMUTATOR SHORT-CIRCUITING DEVICE FOR ELECTRIC MOTORS; E. C. Ballman, St. Louis, Mo. App. filed Feb. 12, 1926.

1,724,565. APPARATUS FOR TESTING INSULATION; A. S. Dana, Ansonia, Conn. App. filed Jan. 10, 1925.

1,724,576. METHOD OF MEASURING DISTANCE; W. F. Grimes, South Pasadena, Cal. App. filed Jan. 7, 1925.

1,724,583. ELECTRIC FURNACE; C. I. Hayes, Providence, R. I. App. filed May 12, 1928.

1,724,584. LUMINOUS-TUBE SIGN; W. F. Hendry, Ossining, N. Y. App. filed Dec. 4, 1926.

1,724,585. ELECTRICAL AIR HEATER; W. W. Hicks, San Francisco, Cal. App. filed July 25, 1927.

1,724,592. SOFT-RUBBER PLUG AND SOCKET BODY; F. W. Hudson, San Francisco, Cal. App. filed Feb. 23, 1928.

1,724,597. CIRCUIT CLOSER; A. Janer, Flushing, N. Y. App. filed May 23, 1925.

1,724,602. ELECTRIC CONTROL FOR ELECTRICALLY-DRIVEN VEHICLES; T. S. Kemble, Cleveland, O. App. filed July 2, 1924.

1,724,607. RECTIFIER CIRCUIT; E. W. Lincoln, Chicago, Ill. App. filed May 9, 1927.

1,724,618. MAGNETO; B. P. Remy, Indianapolis, Ind. App. filed Aug. 5, 1927.

1,724,650. SYNCHRONOUS-MOTOR-CONTROL SYSTEM; H. E. Fox, Pittsburgh, Pa. App. filed June 24, 1924.

1,724,654. CIRCUIT-DISABLING DEVICE FOR ELECTRIC LAMPS; R. T. Hosking, Wilmette, Ill. App. filed Mar. 9, 1928.

1,724,675. ELECTRIC SWITCH; G. J. Meuer, A. H. Fleet, Milwaukee, Wis. App. filed Jan. 22, 1923.

1,724,682. DISTRIBUTOR; L. B. Sauer, Western Springs, Ill. App. filed Apr. 24, 1924.

1,724,729. ELECTRICAL CONTACT CLIP; S. Ruttenberg, Brooklyn, W. S. Mierendorff, New York, N. Y. App. filed July 19, 1927.

1,724,730. COMPENSATED ASYNCHRONOUS MACHINE WITH SUPPLY TO THE ROTOR; W. Sarfert, Dresden, Germany. App. filed July 21, 1925.

1,724,734. ELECTRICAL MEASURING INSTRUMENT; W. M. Scott, Lakewood, R. E. Tresise, Cleveland Heights, O. App. filed Nov. 21, 1925.

1,724,753. CABLE TERMINAL CONNECTER; C. W. Doherty, Phoenix, Ariz. App. filed Aug. 9, 1927.

1,724,758. THERMAL RELAY; F. W. Gay, Newark, N. J. App. filed Aug. 24, 1928.

1,724,763. CLAMPING TERMINAL; C. F. Jacobs, Brooklyn, N. Y. App. filed May 6, 1927.

1,724,767. DENTAL WATER HEATER; R. A. Mercer, Phila., Pa. App. filed Apr. 13, 1928.

1,724,771. INTERCHANGEABLE CONTACT EXTENSION; F. R. Paivio, Raisio, Finland. App. filed Sept. 28, 1927.

1,724,776. ELECTRIC SWITCH; W. K. Rankin; Scotia, N. Y. App. filed Jan. 31, 1924.

1,724,782. MOUNT-FINISHING MACHINE; A. Sittel, Berlin, Germany. App. filed Jan. 30, 1928.

1,724,792. CONTROL FOR LOCKS OR THE LIKE; H. S. Chase, Boston, W. R. Fletcher, Southwick, Mass. App. filed Jan. 24, 1924.

1,724,794. METHOD OF DETECTING ORE DEPOSITS; W. W. Davis, Great Neck, N. Y. App. filed Feb. 20, 1925.

1,724,815. COUPLING FOR ELECTRICAL FIXTURES; W. A. Adams, Rochester, N. Y. App. filed Dec. 31, 1926.

1,724,820. SUPERPOTENTIAL DISCHARGE INSTALLATION; C. E. Bennett, Decatur, Ga. App. filed Nov. 23, 1923.

1,724,825. ELECTROMECHANICAL RELAY MOTOR; M. Chirol, Bourg-La-Reine, France. App. filed Oct. 20, 1926.

1,724,830. SYSTEM OF MOTOR CONTROL; J. Eaton, Schenectady, N. Y. App. filed Oct. 19, 1926.

1,724,831. PRECISION BASING MACHINE FOR INCANDESCENT LAMPS AND SIMILAR ARTICLES; J. T. Fagan, J. J. Malloy, Cleveland Heights, O. App. filed June 16, 1926.

1,724,833. METER COMPENSATING DEVICE; H. T. Faus, Lynn, Mass. App. filed Apr. 24, 1928.

1,724,837. METHOD OF CALIBRATING INSTRUMENTS; L. E. Hildebrand, Cliftondale, Mass. App. filed Oct. 13, 1927.

1,724,838. ELECTRIC SWITCH; J. D. Hilliard, Schenectady, N. Y. App. filed May 21, 1926.

1,724,840. CIRCUIT MAKER AND INTERRUPTER; B. W. Jones, Schenectady, N. Y. App. filed Mar. 26, 1926.

1,724,846. VOLTAGE REGULATOR; M. Lock, Berlin, Germany. App. filed Jan. 7, 1925.

1,724,863. TIME-LIMIT DEVICE; L. S. Walle, Scotia, H. W. Brown, Schenectady, N. Y. App. filed Jan. 23, 1926.

1,724,868. FUSE; J. P. Arndt, J. W. Lelivelt, Jr., Cleveland, O. App. filed Sept. 20, 1926.

1,724,870. SAFETY DEVICE FOR ELECTRICAL APPARATUS; T. A. E. Belt, Schenectady, N. Y. App. filed Feb. 1, 1927.

1,724,884. VARIABLE CONDENSER; A. Nyman, East Orange, N. J. App. filed May 24, 1924.

1,724,887. BUS-BAR SUPPORTING STRUCTURE; W. H. Schramm, Pittsburgh, Pa. App. filed Aug. 3, 1927.

(Issued August 20, 1929)

Re. 17,411. SIGNALING SYSTEM FOR ELEVATORS; R. H. Gaylord, Los Angeles, Calif. App. filed Aug. 22, 1923.

1,724,907. SWITCH LOCK; C. B. Coates, Cleveland, O. App. filed Aug. 12, 1924.

1,724,924. TELEPHONE SYSTEM; F. H. Graham, New York, N. Y. App. filed March 26, 1926.

1,724,927. ELECTRIC IRON; J. A. Guyer, Marion, Ind. App. filed April 26, 1926.

1,724,930. DOOR LOCK CONTROLLED SWITCH MECHANISM; G. H. Hart, West Hartford, Conn. App. filed Nov. 14, 1927.

1,724,935. ELECTRIC TRANSFORMER; A. Huet, Loignies, Belgium. App. filed Jan. 4, 1928.

1,724,956. MUFFLE, MUFFLE FURNACE, AND THE LIKE; P. H. P. Monckton, Johannesburg, Transvaal, South Africa. App. filed Nov. 23, 1927.

New Trade Literature

POTENTIAL TRANSFORMER PROTECTIVE EQUIPMENT.—Bulletin No. 200-R on potential transformer protective equipment has just been issued by Schweitzer & Conrad, Inc., 4435 Ravenswood Avenue, Chicago. The bulletin covers the S. & C. type and D. L. C. fuse, current-limiting resistors, potential transformer protective combinations, pole-pull fuse mountings and shows amply illustrated a number of typical combinations of S. & C. protective combinations.

RESPIRATORY PROTECTIVE EQUIPMENT.—A booklet discussing a number of the problems relating to protective equipment for mining and industrial purposes has just been issued by the Mine Safety Appliances Company of Pittsburgh. The booklet is written in the form of questions and answers on the use of this equipment, including oxygen-breathing apparatus, Burrell all-service gas masks, the M.S.A. self-rescuer, M.S.A. carbon monoxide detector, H.H. insulator, M.S.A. high-pressure oxygen pump, etc. Questions which may be asked in preliminary examination of mine rescue crews at mine rescue meets are also included.

COG BELT DRIVES.—The Westinghouse Electric & Manufacturing Company announces the publication and distribution of its leaflet 20392, entitled "Cog Belt Drives for Industrial Service." The uses, advantages and construction of cog belt drives are clearly and concisely explained. Illustrations of construction and application of these drives are included. The leaflet also includes a table of available standard sizes of belts.

TORCHWELD LINE OF WELDING EQUIPMENT.—A new catalog, No. 29, covering the Torchweld line with cross-sectional views of gas welding and cutting, lead welding, soldering, brazing and decarbonizing equipment, automatic and hand welding and cutting machines and torches, gas pressure regulators, acetylene generators, welding supplies and general information has been issued by the Torchweld Equipment Company, 224 North Carpenter Street, Chicago. The catalog contains 40 pages.

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number:

Purchase is desired in Amsterdam, Netherlands (No. 40,495), of flashlight batteries.

Purchase is desired in Durban, South Africa (No. 40,492), of storage batteries.

Purchase is desired in Montevideo, Uruguay (No. 40,496), of battery-charging sets.

An agency and purchase are sought in Warsaw, Poland (No. 40,512), for electric floor surfacers.

An agency is sought in Munich, Germany (No. 40,497), for heating and cooking equipment and other electrical appliances.

Purchase is desired in Hong Kong, China (No. 40,522), of hydro-electric machinery to develop 300 hp.

Purchase is desired in Riga, Latvia (No. 40,446), of electrical motors.

An agency and purchase are sought in Buenos Aires, Argentina (No. 40,444), for electric ranges.

Purchase is desired in Munich, Germany (No. 40,533), of electric refrigerator units.

An agency is sought in Peking, China (No. 40,434), for electric railway signals.

Purchase is desired in Wellington, New Zealand (No. 40,519), of transformers, 110 kv.

Purchase is desired in Montevideo, Uruguay (No. 40,496), of industrial electric trucks.

An agency and purchase are sought in Warsaw, Poland (No. 40,512), for electric vacuum cleaners.